e-Learning Systems Success in an Organisational Context

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ABSTRACT

Issues around effective implementation, management, and success of e-Learning systems have drawn the attention of many researchers. However, e-Learning systems success research still lacks models and frameworks addressing organisational dimensions along with instructor and learner dimensions, particularly in the New Zealand higher education context. Hence, the purpose of this research was to explore the dimensions of e-Learning systems success in an organisational context.

Based on a broad review of literature, I formulated a multidimensional framework of e-Learning systems success in the organisational context and used the framework to develop two e-Learning success models: a model from the instructor perspective and a model from the learner perspective. To test the framework and to explore the dimensions of e-Learning systems success, I conducted three empirical studies. First, a preliminary study with 43 e-Learning experts was carried out to confirm the content validity of the measurement instruments. The e-Learning systems success models were then tested in the organisational context of New Zealand universities by fitting the instructor model to data collected from 204 instructors engaged in e-Learning and by fitting the learner model to data collected from 189 students with e-Learning experience.

The study identified quality of the e-Learning development and implementation process as a dimension of e-Learning systems success. This study was the first to formulate and to test a measure for e-Learning development and implementation process quality. An insight into the instructor views of this dimension was obtained by qualitative analysis of their free-text comments. Moreover, the study was the first to formulate and to test a multidimensional e-Learning systems success model based on DeLone and McLean's (2003) IS success model focusing on instructors as the stakeholders. The study investigated the effect of organisational dimensions on other dimensions of e-Learning systems success, accounting for both instructor and learner perspectives in the same organisational context. Of the organisational dimensions considered, quality of the e-Learning system was the most influential. Quality of the e-Learning development and implementation directly affected other organizational dimensions, system quality and institutional support to the instructors, and affected instructor dimensions indirectly.

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LIST OF ABBREVIATIONS

IT	Information technology
IS	Information system
LMS	Learning management system
PLS	Partial least squares
SSCI	Social science citation index
TAM	Technology acceptance model
PU	Perceived usefulness
PEOU	Perceived ease of use
AVE	Average variance extracted
URL	Uniform resource locator
SEM	Structural equation modelling
MUHEC	Massey university human ethics committee

CHAPTER 1: INTRODUCTION

1.1 Background of the research

e-Learning refers to delivering learning by using a variety of electronic media, especially Internet technologies (Ozkan & Koseler, 2009). According to Rosenberg (2001, p.28), the three fundamental criteria for e-Learning are: (1) it is networked; (2) it is delivered to the end user via a computer using Internet technology; and (3) it focuses on the broadest view of learning that goes beyond the traditional paradigms of teaching and learning.

Information technology deployed at organizations, such as tertiary education providers, to enable e-Learning leads to organizational e-Learning systems—a new type of information systems. Such e-Learning systems may be based on Learning Management Systems (LMS)—application software supporting basic e-Learning functionality (Olyfemi, 2007), such as Moodle (Moodle Community, 2012) or Blackboard (Blackboard, 2012). Further e-Learning capabilities may be provided by adding specialized software, such as Adobe Connect, with the full set of e-Learning tools supported by the organization forming the organisation's e-Learning system (for a more detailed discussion of how the terms e-Learning, e-Learning system, and LMS relate to each other, refer to section 2.4.1). Even though occasionally, innovative instructors may provide e-Learning by using new tools that are not part of their organization's e-Learning system, the bulk of e-Learning at organizations is provided via e-Learning systems (the fraction of innovators in a typical population is small, estimated as about 2.5% by Rogers, 1995).

The emergence of large scale e-Learning systems is one of the most significant developments in the information systems (ISs) industry over the last 15 years (Wang, Wang, & Shee, 2007). Thus, the traditional context of education has encountered dramatic changes with the emergence of Internet-based teaching and learning (LeePost, 2009). According to a press release by Global Industry Analysts, Inc. (2010), the global e-Learning market is estimated to reach $107.3 billion by the year 2015.

The effective use of information technology (IT) in teaching and learning has been viewed as having the potential to improve the quality of learning as well as access to education and training (Gilbert, Morton, & Rowley, 2007). e-Learning caters to ever-growing and diversified learning needs. According to Ozkan, Koseler, and Baykal (2009), e-Learning has become the new paradigm in education because of its convenience, reduction of costs, and flexibility. Biasutti (2011) emphasised the cost effectiveness of e-Learning as a benefit for both higher education and industry. This view was further supported by Rosenberg (2001, p. 30) who identified cost effectiveness, availability any-where and anytime, building communities, and providing valuable customer service as several benefits of e-Learning. A press release by Global Industry Analyst (2010) described benefits of e-Learning as being able to learn anytime, anywhere, and being able to access worldwide mentoring resources for maximum skill development.

Many higher education institutions are motivated to introduce innovative e-Learning programmes by expanding their educational boundaries. However, the development and implementation of successful e-Learning systems is quite challenging to higher education institutions and for business organisations because of the size of the investment required and because of the uncertainty of the outcomes (Govindasamy, 2002). Thus, an understanding of the dimensions of e-Learning success is essential for the development and delivery of successful e-Learning initiatives (Lee, Yoon, & Lee, 2009) and for continuous improvement of existing systems (Ozkan & Koseler, 2009). Govindasamy (2002) also stated that measurement of e-Learning systems success is essential to develop better e-Learning initiatives and to yield a justifiable return on investment.

The large investment and rapid growth in the adoption of e-Learning have motivated researchers to study the success of e-Learning systems and the issues related to their implementation (Lee et al., 2009; Lee & Lee, 2008; Park, 2009). A considerable number of studies have attempted to use measures such as user satisfaction, user acceptance, learning effectiveness, and e-Learning continuance intention in assessing e-Learning systems success. However, there is no universally accepted definition for e-Learning systems success.

As e-Learning systems are ISs, e-Learning systems success can be viewed as ISs success. Saarinen (1996) reviewed different definitions of systems success in Management Information Systems literature, and found that most of the researchers defined information systems success as a favourable or satisfactory result or outcome from the perspective of different stakeholders. At the same time, he pointed out the difficulty of clearly defining what system success is because of the need to reconcile different views regarding the content and the scope of ISs success. DeLone and McLean (1992) emphasised that ISs success is multidimensional, with different dimensions affecting each other. They suggested generic dimensions, including the quality of the processing system itself, the quality of the information provided by the system, system use by the users, user satisfaction, and the impact on individuals or organisations. They suggested that ISs success studies in specific contexts would be more meaningful if multidimensional measures are used systematically combining individual success dimensions in an appropriate manner to fit into a particular study context.

e-Learning systems have been studied by different research communities, such as Management Information Systems, Education, and Psychology, as they are multidisciplinary by nature (Kiteley & Ormrod, 2009; Ozkan & Koseler, 2009). However, most of the e-Learning research to date relied on a limited view of e-Learning system success, with most studies using a single success dimension (such as learner satisfaction or learning effectiveness). There are e-Learning systems success studies (such as Holsapple & LeePost, 2006; Wang, et al., 2007) that follow DeLone and McLean (2003) in representing systems success as multidimensional, with the dimensions affecting each other. These studies, however, focus on a single type of stakeholder, namely, learners. There are no frameworks or models of e-Learning systems success that would account for multiple stakeholders, by combining organisational dimensions, instructor dimensions, and learner dimensions.

Although there are a large number of attempts by previous researchers to develop and test models of e-Learning systems success, the number of studies in Australasia region is limited. In particular, most of the existing studies representing e-Learning systems success as multidimensional were conducted in Taiwan or Korea, and, thus, in a cultural context very different from New Zealand.

1.2 Statement of the research problem

The existing literature does not provide (a) a coherent, multifaceted view of e-Learning system success dimensions in an organisational context and (b) a single examination of the dimensions of e-Learning systems success in an organisational context from the perspectives of the two important groups of stakeholders: instructors and learners. Insufficient understanding of the dimensions of e-Learning systems success and of their interrelationships hinders the successful implementation of e-Learning initiatives by organisations.

In considering e-Learning systems success, instructors are important stakeholders, as they are the final implementers of e-Learning (Mahdizadeh, Biemans, & Mulder, 2008). Similarly, learners are important stakeholders as key users of e-Learning systems. Both instructors and learners engage in e-Learning related activities in the context of education providers or other organisations, with organisational processes affecting the experiences of the stakeholders. Therefore, to understand e-Learning systems success, it is important to explore the dimensions of e-Learning systems success in the organisational context, from both the instructor and the learner perspective.

1.3 Research questions

The purpose of this research was to explore the dimensions of e-Learning systems success in an organisational context, with the focus on instructors and learners as important stakeholders. The research addressed the following questions:

1. How can various facets of the concept of e-Learning systems success be organised as a multidimensional framework?
2. From the instructor and from the learner perspective, what are the dimensions of e-Learning system success in an organisational context, and how do they relate to each other?

To address the first research question, I carried out a review of the literature related to ISs success and e-Learning systems success (a systematic review followed by a broader unstructured review). Based on the review, I formulated a framework organising various facets of e-Learning systems success. The framework was used as a basis for formulating two research models comprising hypotheses about the relationships between the success dimensions: a model with an instructor as a unit of study and a model with a learner as a unit of study. The two models can be seen as extensions (with the emphasis on the organizational context) of existing models from the instructor and from the learner perspectives—comparisons to the existing models are given in section 2.5. Because the models derive from the same framework, the complementary perspectives they offer rely on the same underlying vocabulary and the same underlying structure, which makes it easy to compare the two perspectives and to integrate them into a fuller picture. These models were tested with data collected at universities in New Zealand, thus addressing research question two. A more detailed summary of the research methodology is provided in section 1.6.

1.4 Theoretical framework

In order to answer the research questions identified above, a three tier multidimensional framework of e-Learning systems success in the organisational context was derived based on a review of the literature (see Figure 1.1). A detailed discussion on the review is presented in chapter two. The overall success of an e-Learning system comprises a number of dimensions such as user satisfaction, level of learning, quality of the e-Learning system, and quality of the e-Learning content, all reflecting different facets of e-Learning systems success. I categorised these dimensions as organisational dimensions, instructor dimensions, and learner dimensions.

After reviewing the literature relating to both e-Learning systems success and ISs success, it is evident that the success dimensions suggested or implied by the existing studies are often similar to one or more of the success dimensions identified in the IS success model by DeLone and McLean (2003), and therefore, are related to the DeLone and McLean IS success model. A number of previous research studies have established the validity of DeLone and McLean's IS success model in the e-Learning systems success context, for example, Lee and Lee (2008), Lin (2007), and Wang et al. (2007). Thus, I used DeLone and McLean's IS success model (2003) as the basis for developing the theoretical research models from both the instructor and the learner perspective (discussed in detail in chapter three and chapter four) based on the multidimensional e-Learning systems success framework presented in Figure 1.1. In Figure 1.1, the shaded boxes represent the dimensions similar to the dimensions of the IS success model (DeLone & McLean, 2003).

I classified quality of the institutional support and quality of the e-Learning system (corresponding to service quality and system quality in the IS success model) as organisational dimensions, as these dimensions are determined at organisational level. I found, though, that these dimensions do not cover all of the relevant e-Learning success facets at organisational level, and, therefore, added a dimension reflecting quality of the e-Learning development and implementation process, for which there was support in the literature (inspired by the process maturity theory, Larsen, 2003).

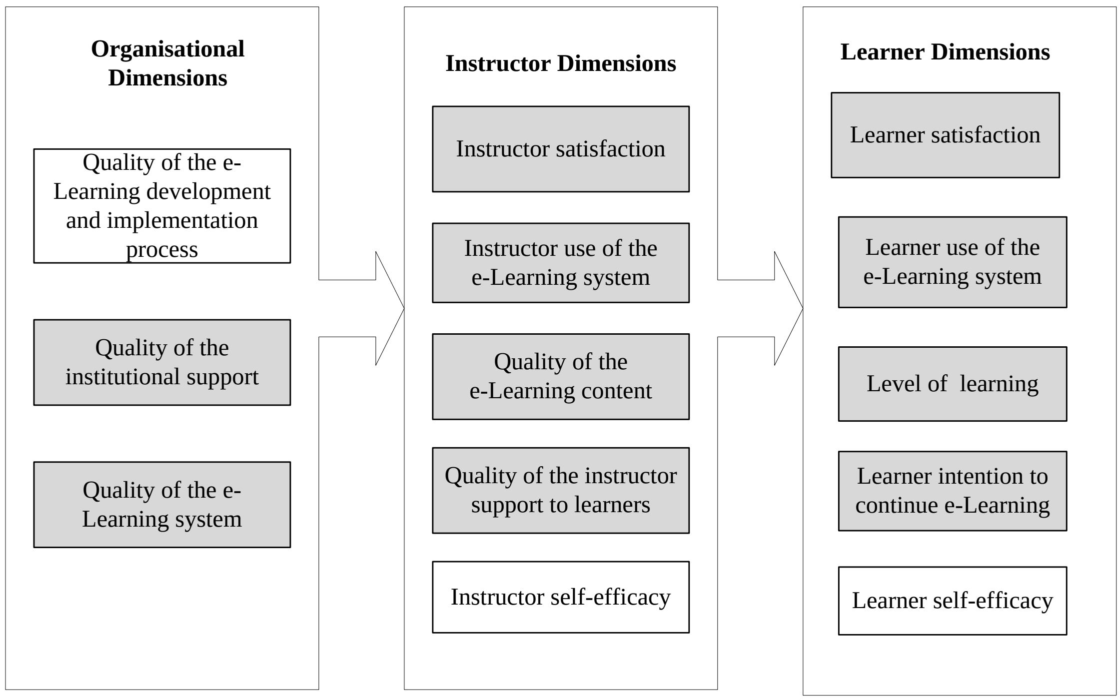


Figure 1.1 Facets of e-Learning systems success.

Some of the dimensions of e-Learning systems success revealed in the literature (in particular, instructor and learner self-efficacy examined in this research) can be traced to social cognitive theory (Bandura, 1997). Social cognitive theory is a widely accepted theory explaining individual behaviour. It focuses on the relationships among behaviour, cognition, and environment (Bandura, 1986). In social cognitive theory, self-efficacy is an important aspect of cognition (Bandura, 1986; Miltiadou & Savenye, 2003; Stajkovic & Luthans, 1987). Bandura (1986) defined self-efficacy as,

> People's judgments of their capabilities to organise and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses (p.391).

The overall theoretical foundations behind the e-Learning systems success framework (section 2.4.5) and the e-Learning systems success models from the instructor and the learner perspectives (see sections 3.3 and 4.3, respectively) formulated and tested in this research are depicted in the diagram in Figure 1.2.

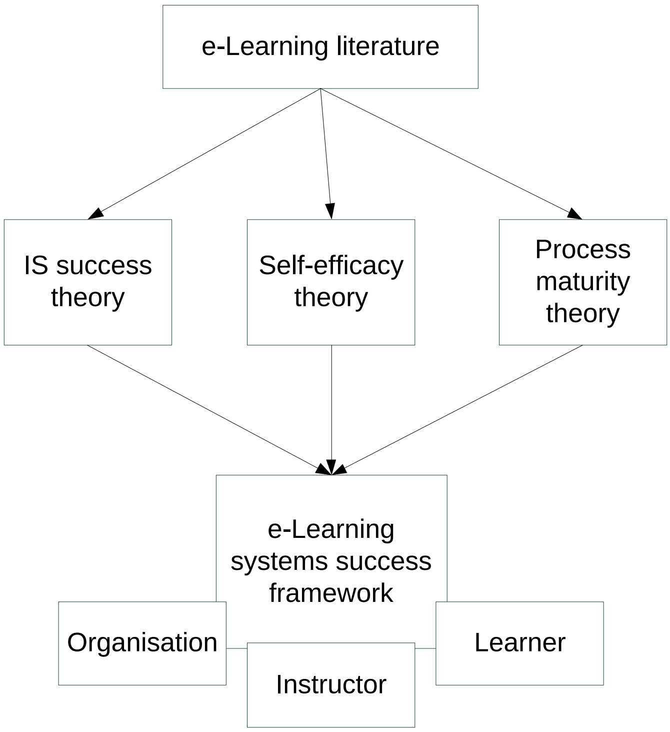


Figure 1.2 Theoretical foundations of this research.

1.5 Significance of the research

This section explores the overall significance of this research in terms of contributions to theory and practice. The detailed implications for theory and practice are presented in the last chapter in section 7.4.

1.5.1 Contributions to theory

The study identifies the dimensions of e-Learning systems success in an organisational context and organises them in a framework that can be used to formulate models of e-Learning systems success appropriate for particular contexts. The usefulness of the framework is demonstrated by formulating and validating two e-Learning systems success models.

The study formulates and tests a multidimensional model of e-Learning systems success focusing on instructors as the stakeholders. This is the first study of this kind from the instructor perspective.

The study formulates and tests a multidimensional model of e-Learning systems success focusing on learners as the stakeholders. By doing this, the study further validates the existing models of e-Learning systems success from the learner perspective. The study extends the existing models by adding constructs motivated by self-efficacy theory and information systems continuance intention theory.

1.5.2 Contributions to practice

The model of e-Learning systems success from the learner perspective was developed and validated in this research by complementing and extending the existing models of e-Learning systems success, thus enhancing the understanding of the e-Learning systems success dimensions (from the learner perspective). This helps designers and instructors involved in creating and delivering e-Learning experiences.

The models of e-Learning systems success from both instructor and learner perspectives developed and validated in this research help managers and administrators in making decisions regarding designing and administering educational programs involving e-Learning. As the most comprehensive model of this kind, the multidimensional model of e-Learning systems success from the instructor perspective has a particularly high potential to have impact on practice.

The study was conducted in the context of New Zealand universities, and complements a qualitative study of instructor perspectives conducted at the same time in the same context by other researchers (Stein, Shepherd, & Harris, 2011). Therefore, the study is particularly relevant to e-Learning practitioners in New Zealand.

1.6 Summary of methods

In order to address the research questions presented in section 1.3, the following major steps were set out for this research:

1. Systematically review the existing literature with regard to ISs success and e-Learning systems success.

2. Formulate a multidimensional framework of e-Learning systems success in an organisational context based on the literature review, and use it to develop empirically verifiable research models: a model from the instructor perspective and a model from the learner perspective.

3. Test the research models by collecting and analysing empirical data from instructors (university lecturers) and learners (undergraduate students) in the organisational context of New Zealand universities.

Accordingly, this research is based on a systematic review of the literature followed by a broader unstructured review of literature, with both reviews aiming to formulate a multidimensional framework organising the dimensions of e-Learning systems success suggested by the literature. Two research models were derived from the above framework to answer the second question of this research. This research used mainly a quantitative approach with some qualitative input from instructors. Despite the qualitative data being used to add more insight to the quantitative findings, the quantitative approach was the dominant method. The sample for this research was instructors and students from New Zealand universities. This research employed the survey questionnaire method to allow the researcher to collect data from a large sample. Survey instruments were developed to collect data from the two participant groups. Items in the instruments were mainly based on the available literature.

As content validity of the survey instruments is vital to ensure the data are relevant, a content validity study with e-Learning experts and practitioners was carried out. From the expert comments gathered, changes to the measurement items were made. The data collection process consisted of four stages: pre-test, expert survey, pilot test, and main survey. Pre-tests and pilot tests were carried out to further refine the survey instruments. The research was carried out at a single point in time, therefore, it was a cross sectional study. The units of analysis in this research were the individual instructor and the individual learner.

The data collection was conducted with two participant groups, namely, university lecturers and undergraduate students. The survey with the lecturers was carried out in colleges of education in all New Zealand universities except for Lincoln University as it does not have a college of education. For the student survey, all the students enrolled for level one IT related papers in semester two of 2010 at all eight universities in New Zealand were targeted. In the data analysis stage, demographic data analysis and the primary data screening were carried out by using descriptive data analysis techniques. The model validation and hypotheses testing were carried out using the partial least square technique (PLS), a second generation structural equation modelling technique (SEM). The qualitative data analysis was conducted using the constant comparative method.

1.7 Overview of the thesis

This thesis is organised in seven chapters, including the current, introductory chapter. Figure 1.3 illustrates an overview of the thesis, depicting chapters and chapter dependencies. A more detailed overview of the rest of the chapters of this thesis is presented in the following paragraphs.

Chapter 2: Review of literature. The chapter reviews the literature relating to different views of ISs success and e-Learning systems success. It begins by presenting the outcome of a systematic review of e-Learning systems success literature that I conducted to identify the trends in e-Learning systems success research. Following this, I present the dimensions of e-Learning systems success identified in a broader, unstructured literature review building on the systematic review. Then, I discuss the existing attempts to formulate multidimensional models of e-Learning systems success. Finally, I present the framework of e-Learning systems success in the organisational context that I formulated based on the literature review.

Chapter 3: Model development: e-Learning systems success—a study from the instructor perspective. In this chapter, I formulate an e-Learning systems success model focusing on instructors as the stakeholders. The model is derived from the broad framework introduced in chapter two, and includes organisational and instructor dimensions. The definitions of constructs are presented before the discussion on the research model. Then, the individual hypotheses included in the model are stated and justified.

Chapter 4: Model development: e-Learning systems success—a study from the learner perspective. In this chapter, I formulate an e-Learning systems success model focusing on learners as the stakeholders. The model is derived from the broad framework introduced in chapter two, and includes organisational, instructor, and learner dimensions. The definitions of constructs are presented before the discussion on the research model. Then, the individual hypotheses included in the model are stated and justified.

Chapter 5: Research methodology. This chapter introduces and justifies the methods used in this research. Based on the research problem and the research questions stated in chapter one, I justify using quantitative, explanatory, correlation survey based research in this study. Next, the development of the research instruments, the research participants, and the approaches to data collection and data analysis are presented. This is followed by a discussion of how reliability, validity, and data screening issues are addressed. The chapter concludes by discussing relevant ethical issues.

Chapter 6: Data analysis and discussion. In this chapter, the outcomes of the data analysis are presented. A discussion of the outcomes of data screening is followed by the results for the two models: the model from the instructor perspective and the model from the learner perspective. For each model, the descriptive statistics for the sample are followed by a discussion of model testing, first of the measurement model and then of the structural model. The outcome for each individual hypothesis is discussed separately, in view of the outcomes of the related prior studies. For the model from the instructor perspective only, this is followed by the analysis of qualitative data entered by instructors along with responding to structured survey questions.

Chapter 7: Conclusions and implications. This chapter summarises the overall findings of the research. Following an overview of the thesis, the chapter presents the summary of findings in relation to the research questions. The implications of the research for theory and for practice are discussed, followed by limitations of the research, suggestions for future research, and concluding remarks.

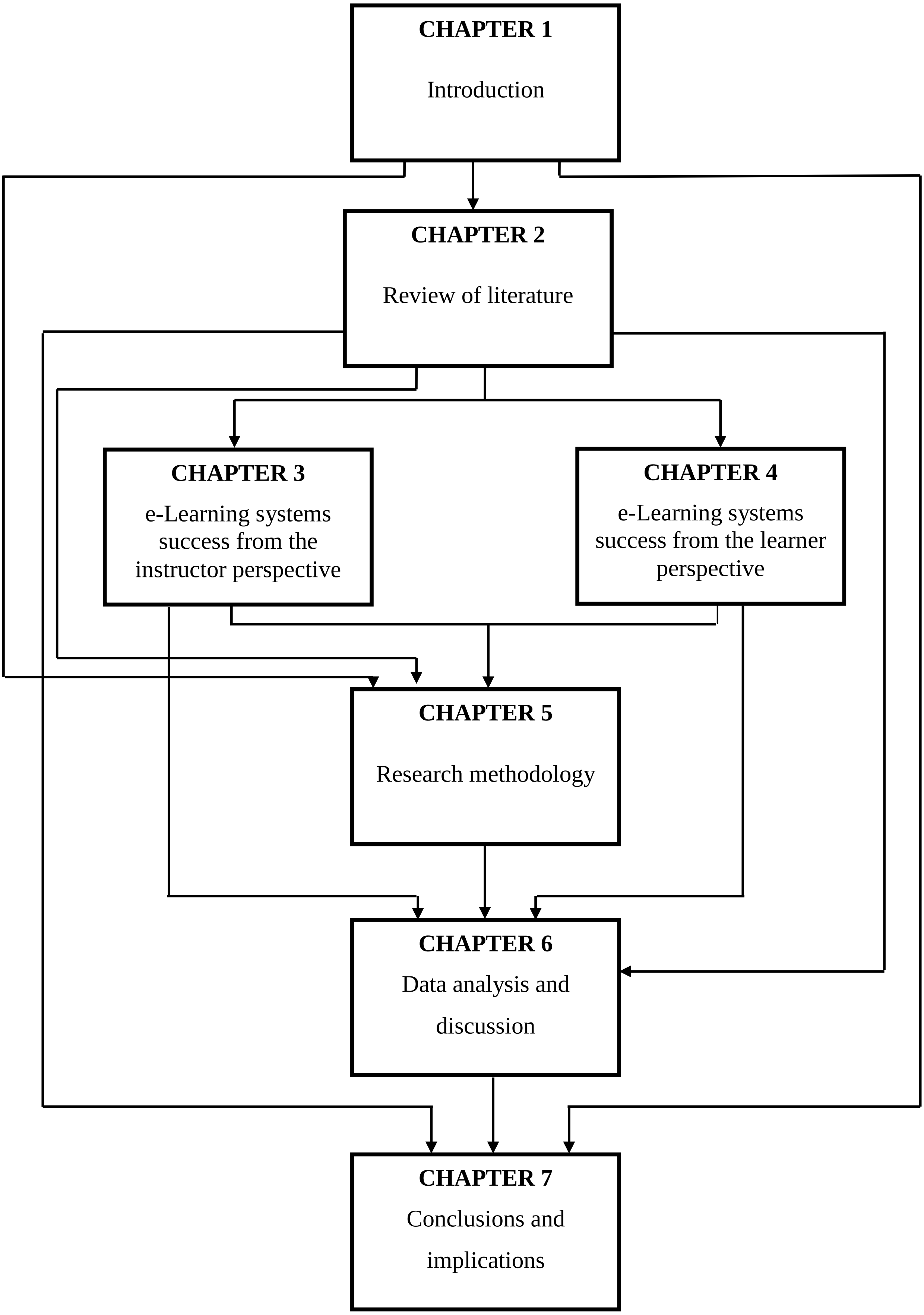


Figure 1.3 Overview of the thesis.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Introduction

This chapter examines the existing approaches to conceptualising e-Learning systems success and identifies the factors contributing to e-Learning systems success, thereby providing a theoretical base for this research. The approach suggested by Webster and Watson (2002) is adopted in the present review of the literature. Accordingly, the chapter commences with a discussion of a systematic review that identifies current research trends in e-Learning success studies. The chapter discusses the scope of the review, the analysis of the distribution of articles among the topic areas identified, the growth trends of publications for different topic areas, and the limitations of the review. Next, a broader unstructured review of the literature building upon the systematic review is carried out to identify the dimensions of e-Learning systems success and to develop a multidimensional framework of e-Learning systems success in the organisational context. Then, the multidimensional e-Learning systems success framework, formulated based on the literature, is presented. This is followed by a discussion of existing multidimensional e-Learning systems success models based on the IS success model (DeLone & McLean, 2003). The research gaps identified from the review are presented next.

2.2 The scope of the literature review

The literature review was conducted in two stages. First, a systematic review was carried out to identify the trends in e-Learning systems success studies (see section 2.3). The systematic review covered the period from January 2000 to December 2008. The method used to conduct the systematic review is described in section 2.3.1, and the trends discovered in the systematic review are presented in section 2.3.2.

To ensure that important relevant studies that did not fit the criteria used in the systematic review are not over looked, an unstructured review of literature was carried out, building on the systematic review and covering the literature that appeared before January 1 2009 (the systematic review and the unstructured review were conducted in 2008). Based on insights gained in the systematic and the unstructured review of literature, I formulated the multidimensional e-Learning systems success framework (see section 2.4.5) and the two research models of the present study: e-Learning systems success model from the instructor perspective (see section 3.3) and e-Learning systems success model from the learner perspective (see section 4.3). Prior studies that formulated similar research models (multidimensional models of e-Learning systems success based on DeLone and McLean IS success model or task technology fit model) that have been published before January 1 2009 (and thus influenced the research models formulated and tested in the present study) are discussed in detail in section 2.5.3.

A number of studies that formulated research models similar to the research models of the present study that appeared after January 1 2009 are discussed in section 2.5.4. These studies appeared after the research models of the present studies were fixed; therefore, they were not taken into account in formulating the research models (and are out of the scope of the main literature review effort of the present study). These studies are covered to set out more precisely the contribution of the present study.

2.3 Trends in e-Learning systems success literature

The number of publications relating to e-Learning success has shown a dramatic increase in recent years but there is no review of the literature that reflects what is known about the success of e-Learning systems. Heeding Webster and Watson's (2002) suggestion that a literature review should start with a systematic review covering a well-defined scope, this section reports the results of a systematic review summarising the trends in e-Learning systems success literature from the years 2000 and 2008. That year range was selected because, according to a preliminary review of literature, it was found that most of the publications covering e-Learning systems success dimensions other than effectiveness in supporting learning appeared after 2000. Thus, the chosen timeframe covered most of the existing research relevant to viewing e-Learning systems success as a multidimensional construct.

2.3.1 Method used to conduct the systematic review

The systematic review covered journal articles, excluding other types of publications such as conference proceedings, theses and dissertations, book reviews, and editorial materials. The main reason for selecting only journal articles for systematic review was that journals offer the highest quality assurance by publishing peer-reviewed articles. Further, journal articles are likely to be the most influential according to citation numbers, and journals are likely to provide major contributions (Webster & Watson, 2002). In addition, academics and practitioners use journals both for obtaining and for disseminating new knowledge (Nord & Nord, 1995), whereas media such as books are primarily focused on distributing already established knowledge (Hamilton & Ives, 1982). In order to cover the most influential publications, highly ranked journals were selected from the ISI Social Science Citation Index (SSCI) report (ISI SSCI, 2008).

The selection of articles for the review was based on three SSCI subject categories: education and education research, information science and library science, and psychology. The rationale for focusing on these subject categories was based on a preliminary search of articles in the subject categories given in the ISI SSCI report. Journals with an impact factor greater than or equal to .9 were searched in the three above named subject categories. The cut-off for the impact factor was chosen to ensure that the best known journals publishing in the subject areas were included.

I conducted the review between July and November 2009, covering the period from January 2000 to December 2008. Only items that were identified as articles in the SSCI and published in English were reviewed. First, I searched for relevant articles using the search terms *satisfaction*, *acceptance*, *effectiveness*, *success*, and *use*. The search criteria intentionally did not include the words *e-Learning*, *on-line learning*, or *web-based learning*, in order to ensure that all eligible articles were considered. The articles relevant to the topic of e-Learning systems success were then selected based on the information given in the abstract of each article. Next, the full text of each article was reviewed in order to eliminate articles that were not clearly related to e-Learning systems success. As a result of this search, 74 articles were found, published in 10 journals. Five journals were from the education and education research category

(Computers & Education, Educational Technology & Society, Journal of Computer Assisted Learning, British Journal of Educational Technology, and Interactive Learning Environments), three from the information science and library science category (Information & Management, Information Systems Journal, and MIS Quarterly), and two from the psychology category (Computers in Human Behaviour and International Journal of Human Computer Studies).

2.3.2 Analysis of selected studies

2.3.2.1 Article distribution

A total of 74 articles were found in the three subject categories, namely: education and education research, information science and library science, and psychology. Figure 2.1 shows that most of the articles relating to e-Learning success appeared in the education and education research category (74%), while 15% and 11% were in the psychology and information science and library science categories, respectively.

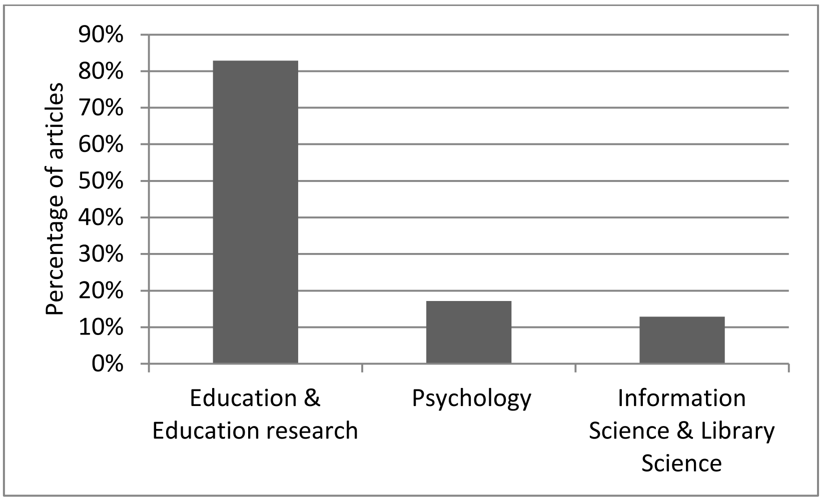


Figure 2.1 Distribution of articles by subject category.

The distribution of articles in selected journals is shown in Figure 2.2. From this analysis, it is observed that, from year 2000 to 2008, Computers and Education published the highest number of articles in relation to e-Learning success (40.51%), more than twice the number in Educational Technology and Society (16.46%) which follows it. Computers in Human Behaviour (11.39%) and the British Journal of

Educational Technology (10.13%) were in third and fourth places in terms of number of articles relating to e-Learning systems success published.

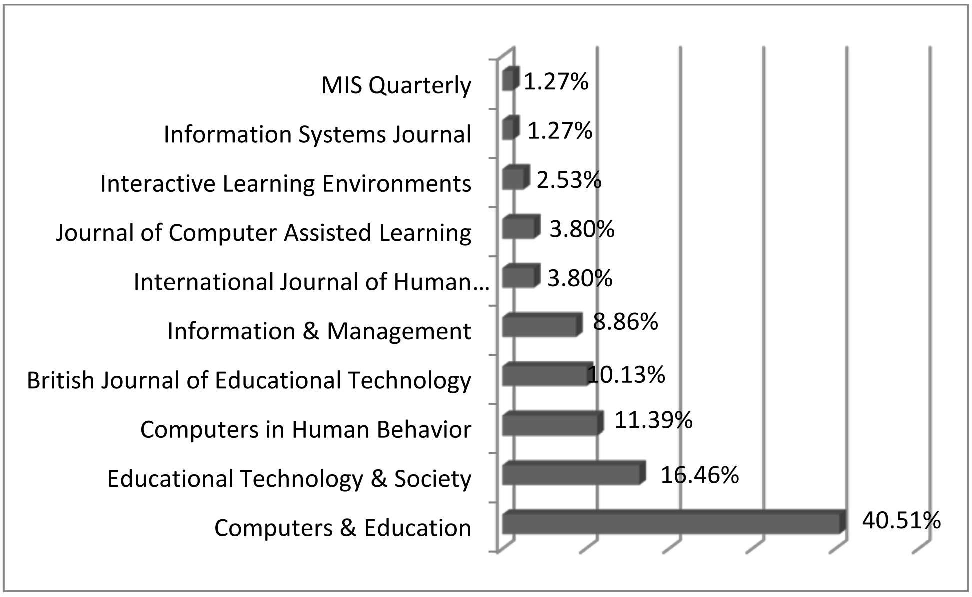


Figure 2.2 Distribution of articles relating to e-Learning success among selected journals.

2.3.2.2 Analysis of e-Learning success dimensions

Four dimensions, satisfaction, acceptance (intention to use or actual use), learning effectiveness, and e-Learning continued usage, were used as the dependent variables. Figure 2.3 shows the number of publications relating to each dimension over the period covered. Most of the articles were related to satisfaction (learner or instructor), followed by learning effectiveness, acceptance (by learner or instructor), and e-Learning continued usage.

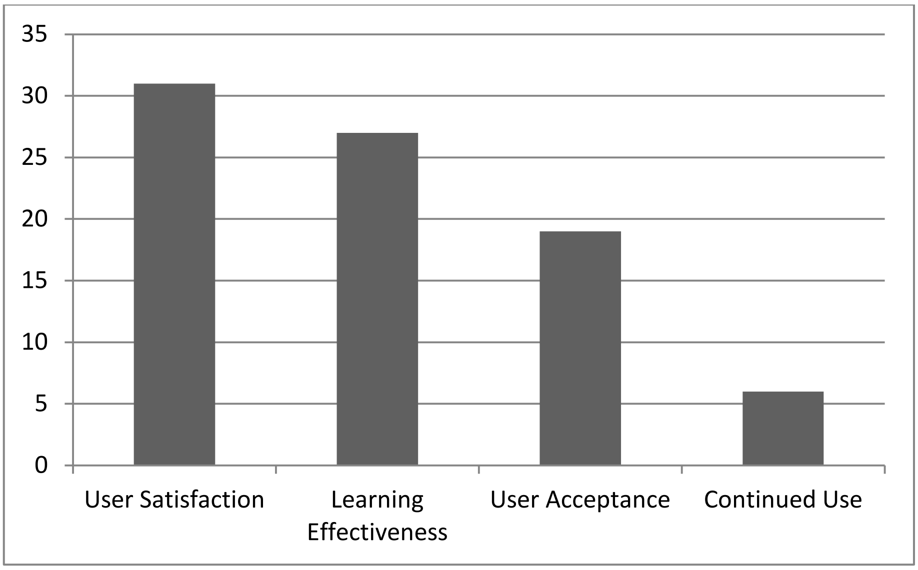


Figure 2.3 Distribution of articles published according to dependent variables. Individual totals do not add up to the overall total because any single study may employ more than one construct.

2.3.2.3 Growth trend of publications

Figure 2.4 presents the growth trend of publications in each category from 2000 to 2008 in the selected journals. From 2002 to 2008, the number of articles using each of these constructs as success measures increased. Although e-Learning continued use was identified early as a success dimension in ISs literature (Bhattacherjee, 2001), it was not tested in the context of e-Learning until 2005. However, from this analysis, it can be seen that the trend is towards increased publications in all four categories.

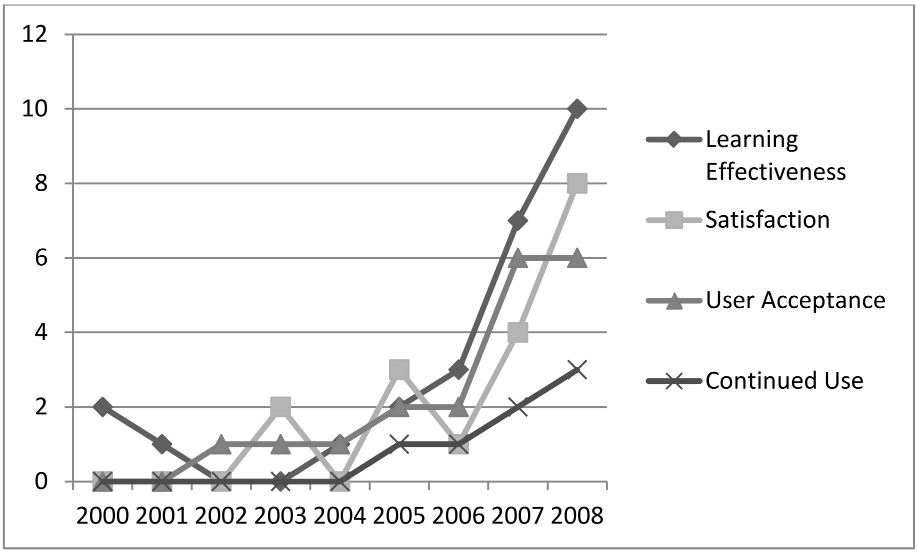


Figure 2.4 Total number of articles published in each year based on dependent variables. Individual totals do not add up to the overall total because any single study may employ more than one construct.

2.3.3 Limitations of the systematic review

The main limitation of the review relates to the potential for bias in the selection of the scope of the review. Because the search is focused only on journal articles in highly rated journals, it is possible that potentially important findings in other types of papers such as conference proceeding papers and dissertations were omitted. Despite these limitations, by identifying the relevant high-profile publications, this review provided a meaningful basis for a broader, unstructured literature review.

2.4 e-Learning systems success dimensions

Following Webster and Watson (2002), based on the systematic review of literature, a broader unstructured review was conducted. I started the unstructured review by considering articles that either cited, or were cited in the articles found in the systematic review, and then followed references or searched for suitable keywords that emerged in the process. The review allowed me to propose a multidimensional framework organising the dimensions of e-Learning systems success suggested by the literature (shown in Figure 2.5). The following subsections provide a detailed discussion of the literature on which the framework was based. As seen in Figure 2.5, in the framework, the dimensions of e-Learning systems success suggested by the literature are organised in three categories: organisational, instructor, and learner dimensions. In the rest of the section, first I discuss the meaning and the etymology of the term *e-Learning systems*, which provides further justification for the framework. Then, the discussion follows along these three categories of the framework.

2.4.1 e-Learning systems

Before discussing the dimensions of e-Learning systems success, it is essential to clarify what is meant by e-Learning and e-Learning systems.

e-Learning is a technology-based instruction delivery method relying on a variety of electronic media including the Internet, intranets, extranets, satellite broadcasts, and interactive TV (Govindasamy, 2002; Ozkan & Koseler, 2009). Nevertheless, no generally accepted definition of e-Learning is available (Brown, Anderson, & Murray, 2007; Lee & Yoon, 2009).

Some researchers view e-Learning as the use of telecommunication technology to deliver learning-relevant information to learners (Sun et al., 2008, p. 1183; Shee & Wang, 2008). Other researchers view e-Learning as learning achieved via web-based communication, and collaboration (Liaw, Huang, & Chen 2007). Liaw and Huang (2012) defined e-Learning as the use of electronic devices for learning purposes.

According to Rosenberg (2001, p. 28), the three fundamental criteria for e-Learning are: (1) it is networked, (2) it is delivered via a computer using Internet technology, and (3) it goes beyond the traditional paradigms of teaching and learning.

Based on the definitions used in existing research, the present study defines e-Learning as the use of information technology tools to promote learning. The present study adopts the common view (see, for example, Phillips & Merisotis, 2000 and Wang & Wang, 2009) that both information technology tools that directly promote learning (such as on-line quizzes) and information technology tools used for course administration, and thus promote learning indirectly (such as online assignment submission tools), are e-learning tools, and that their uses constitute the practice of e-Learning.

In organisations, e-Learning may be delivered by using tools provided in a centralised way, by the organisation. Such tools may involve a Learning Management System (application software that supports content management, knowledge sharing, information gathering and redistribution, as well as opportunities for collaborative activities, Olyfemi, 2007), such as Moodle (Moodle Community, 2012), a platform for video streaming, such as Adobe Connect (Adobe, 2012), or cloud based services targeting specific skill areas, such as Microsoft Office skills (e.g. the services provided by Pearson via the MyItlab product, www.myitlab.com). For example, Massey University, New Zealand uses Moodle and Connect along with other tools, collectively referred to as Stream (Massey University Information Technology Services, 2012), and University of Auckland, also in New Zealand, uses MyItLab (Auckland University, 2012). In the present study, the IT tools provided by an organisation for the purposes of e-Learning are referred to as an e-Learning system.

The DeLone and McLean Information Systems Success model and its extensions (see Petter, DeLone, & McLean, 2008) describe dimensions of IS success (with IS understood as encompassing information technology, support processes, and people); at the same time, the DeLone and McLean Information Systems Success model includes the dimension of system quality, which focuses on the information technology aspect. Thus, the DeLone and McLean Information Systems Success model uses the term *information system* in two different meanings, disambiguated from context. In a similar vein, in the present study the term e-Learning system is also used in two different meanings: to refer to IT tools provided by an organisation for the purposes of e-Learning (as introduced in the previous paragraph) and to refer to IT tools provided by an organisation for the purposes of e-Learning along with people using these tools and with organisational processes enabling the use of these tools throughout the organisation. This conceptualisation is further supported by Lee and Lee (2008) and Samarawickrema and Stacey (2007). They viewed e-Learning system as an interaction between technologies (learning management system as only a part of the e-Learning system) and human service processes. The two meanings are easily distinguishable from context.

Innovators (in the sense of the Diffusion of Innovation theory by Rogers, 2003) may be using technology to facilitate learning in ways that are not yet accepted throughout the organisation. For example, innovators may be using Second Life to teach midwifery skills (Stewart & Davis, 2012), even though Second Life is not accepted as part of the organisation's e-Learning system. Even though uses of new information technology (technology not incorporated in the organisation's e-Learning system) to facilitate learning may affect e-Learning at organisations in the long term in important ways, the share of such innovative practices in current practice is likely to be very small (Rogers, 1995, estimated innovators to occupy only about 2.5% of a typical population). Therefore, the present study does not focus on such e-Learning innovations and considers them to be beyond the scope of the study. Because the present study does not take the innovations involving the use of such new information technology into account, it assumes that all e-Learning at an organisation is conducted via the organisation's e-Learning system. Therefore, in context of the present study, the terms *using e-Learning* and *using the e-Learning system* are essentially synonymous; both of the terms are used in the thesis, with the term *using e-Learning* primarily used when emphasising educational aspects, and the term *using the e-Learning system*—when emphasising technology aspects. Operationally, in context of the present study, every use of e-Learning implies the use of the organisation's e-Learning system, and (as a direct consequence of how the term e-Learning is defined at the beginning of this section) every use of the *e-Learning system* implies the use of e-Learning.

2.4.2 Organisational dimensions

This section presents organisational dimensions of e-Learning systems success. For each dimension, I present the conceptualisation of the construct used in the present study; this is followed by introducing the literature on which the conceptualisation is based.

2.4.2.1 Quality of the e-Learning development and implementation process

Organisations develop and implement e-Learning systems by executing an organisation-wide e-Learning programme (Howell, et al., 2004). *e-Learning programme* refers to the process used to develop and implement organisation-wide e-

Learning. Recent research posited the importance of the *quality of the e-Learning development and implementation process* for e-Learning systems success (Deepwell 2007; Marshall & Mitchell 2004, 2005).

Deepwell (2007) carried out a longitudinal case study to examine factors contributing to the quality of institutional-wide e-Learning implementation. He emphasised that there is a trend in considering e-Learning products, such as courses and programmes, in isolation, without giving due consideration to other constructs such as institutional infrastructure and organisational processes affecting successful e-Learning implementation. Deepwell argued that the quality of e-Learning initiatives needs to be evaluated at organisational level. Consequently, he developed a framework for evaluating the quality of the e-Learning implementation process as an integrated part of e-Learning implementation. The framework involved qualitative analysis of available data and data obtained for the purposes of the evaluation. It was tried at a large university in the United Kingdom. Deepwell suggested that embedding evaluation into the e-Learning development process assures and enhances the quality of the stages of the process. I am not aware of the framework being re-used by other researchers. The framework did not involve quantitative measurement of the e-Learning development and evaluation process.

Similar to Deepwell (2007), Marshall and Mitchell (2003, 2004) asserted that many studies focused on outcomes of individual initiatives without considering organisational context. The aim of their study was to develop an e-Learning process maturity model providing institutions with a means to assess institutional e-Learning capability. Candidate criteria for e-Learning process quality were formulated by reviewing literature and distributed to three Universities in New Zealand. The maturity criteria were revised based on the responses received (which included rating the criteria by importance). The intended use of the model was to inform e-Learning evaluation initiatives, and to facilitate inter-organisational comparisons. The model was not intended for use as a basis for a quantitative measure on an e-Learning development and implementation construct.

Howell, Saba, Lindsay, and Williams (2004) conducted a literature review to formulate strategies for faculty adoption of e-Learning systems. According to them, e-Learning programme evaluation, professional development for instructors, instructor involvement in the process of e-Learning development, and assessment of instructor views for continuous improvement of the e-Learning initiatives are all important for successful faculty adoption of e-Learning systems.

On the other hand, Larsen (2003) reported the findings of a review of a variable analysis study of antecedents of information systems success. The purpose of the research was to conceptualise the information systems success antecedents. Both quantitative (cluster analysis) and qualitative methods were used in the analysis of the literature. According to the categorisation given in the resulting taxonomy, information system maturity is one of the 12 categories that emerged from the analysis and refers to the extent to which the organisation has an established infrastructure indicative of a technology-savvy organisation and mature project development strategies (p. 184). Larsen found that research in information systems maturity is limited, and suggested that the role of information systems maturity as a dimension of information systems success is an important area for future research.

Samarawikrema and Stacey (2007), based on a case study research conducted at a university in Australia, asserted that strong evaluation and assessment policies are a particularly important aspect of the e-Learning development and implementation process, because evaluation and assessment enable organisations to take action.

Therefore, in this research, the quality of the e-Learning development and implementation process is considered as an e-Learning systems success dimension and categorised as an organisational dimension within the e-Learning system success framework (see Figure 2.5).

2.4.2.2 Quality of the institutional support to system users

Quality of the institutional support to system users refers to the quality of the support provided by the organisation to the instructors and to the students that are using the e-Learning system. Support to instructors may involve technical support and support with pedagogical aspects of using e-Learning (Phillips & Merisotis, 2000); support to learners may involve technical support (Wang et al., 2007) as well as provision of generic information services, such as access to library resources online (Selim, 2007).

Recent research identified institutional support to system users as an important dimension of systems success (Selim, 2007; Petruzzellis, D'Uggento, & Romanazzi, 2006; Samarawickrema & Stacey, 2007; Wang & Wang, 2009). Instances are information systems department's support to IS system users in industry (DeLone & McLean, 2003; Wang, 2008) and university or institutional support to instructors involved in e-Learning in higher education institutions (Samarawickrema & Stacey, 2007; Selim, 2007).

Institutional support to instructors was found to be influential in instructor decisions to adopt e-Learning systems (Samarawickrema & Stacy, 2007). Wang and Wang (2009) also identified service quality as a determinant of instructor adoption of e-Learning systems. They operationalised the service quality dimension in terms of training and technical support to instructors involved in teaching online. Samarawickrema and Stacy (2007) examined the constructs related to adoption of web-based teaching on a large multi-campus Australian university in a study that used the case study method. They reported their findings based on responses from 22 teaching academics from the 10 faculties of the university. They found that institutional support to instructors, such as training workshops, induction programmes, continuous progress reviews, and mentoring schemes have an impact on web-based teaching adoption.

Several other studies suggested that institutional support for learners is a determinant of e-Learning system use (Govindasamy, 2002; Masrom, Zainon, & Rahiman, 2008; Selim, 2007). Selim empirically tested four critical success factors for e-Learning system use based on 538 student responses. The critical success factors were: instructor characteristics, student characteristics, technology infrastructure, and university support. The findings suggested that university support is a critical construct in student acceptance of e-Learning systems and were supported by Masrom et al.'s (2008) study. Lee (2008) identified a positive effect of computing support and training on student acceptance of e-Learning. The study was based on 1107 responses from students in Taiwan universities.

Therefore, in this research, institutional support to e-Learning system users was categorised as an organisational dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.2.3 Quality of the e-Learning system

As introduced in section 2.3.1, the present study uses the term e-Learning system in two distinct meanings; when used as part of the term *quality of the e-Learning system* the term e-Learning system is used in its narrower meaning, as a set of information technologies used for e-Learning at an organisation with the explicit support of the organisation. Thus, quality of e-Learning system refers to the quality of the set of technologies (and their implementations) used for e-Learning throughout the organisation with the explicit support of the organisation. Thus, for example, for Massey University, New Zealand, quality the e-Learning system refers to the quality of the set of e-Learning technologies implemented at the university, as listed at the Massey University Information Technologies Services web site (Massey University Information Technologies Services, 2012).

The construct of quality of the e-Learning system (defined similarly to the present study) has been highlighted by a number of authors (Abdous & Yoshimura, 2010; Mahdizadeh et al., 2008; Masrom et al., 2008; Selim, 2003; Soong, Chan, Chua , & Loh, 2001; Sun, Tsai, Finger, & Chen, 2008; Wang, 2003). A few e-Learning researchers examined quality of the e-Learning system from an instructor perspective (Wang, Solan, & Ghods, 2010; Wang & Wang, 2009; Yengin, Karachoca, & Karachoca, 2011). Wang and Wang (2009) proposed a model to investigate instructor adoption of web-based learning, by integrating the technology acceptance model (TAM) (Davis, 1989) and the IS success model (DeLone & McLean, 2003). It hypothesised e-Learning system quality as a determinant of perceived ease of use (PEOU) and perceived usefulness (PU) in their study of 268 university instructors. In a recent study, Wang et al. (2010) proposed a model with system quality, course quality, and impacts (a construct corresponding to individual impact in the Information Systems Success model by DeLone and McLean, 2003) to evaluate distance e-Learning success. They tested the model based on data collected from 548 instructors from seven universities in the USA. In the study, system quality was considered as system flexibility to support course improvement. The system quality construct was measured with interface flexibility, interaction flexibility, content flexibility, structure flexibility, and modularity flexibility. The findings of the study suggest that system quality is a significant determinant of positive effect on users. They also found that multi-item system quality measures were reliable. Yengin, et al. (2011), in their conceptual paper, proposed a multidimensional model of e-Learning systems success based on DeLone and McLean's IS success model from the instructor perspective. They incorporated system quality as a determinant of system use by instructors. However, they did not empirically validate the proposed model.

In addition to the studies from the instructor perspective discussed above, quality of the e-Learning system construct was extensively studied from the student perspective (Adeyinka & Mutula, 2010; Chen, 2010; Chen, 2012; Chen , Chang, Hung, & Lin, 2009; Chiu, Chiu, et al., 2007; Cho, Cheng, & Lai, 2009; Holsapple & LeePost, 2006; Lee, 2010; Lee & Lee, 2008; Ozkan & Koseler, 2009; Pituch & Lee, 2006; Wang et al., 2007; Lin, 2007). Much of the early research on student satisfaction in e-Learning environments proposed quality of the e-Learning system as a predictor of student satisfaction (Arbaugh, 2000; Sun et al., 2008).

Perceived ease of use (PEOU) is the most common measure of quality of the e-Learning system in e-Learning acceptance research. This is because almost all of these studies employed the Technology Acceptance Model (TAM) (Davis, 1989). Thus, in a number of studies PEOU was used as the measure of quality of the e-Learning system (Lee, Cheung, & Chen, 2005; Lau & Woods, 2009; Ong & Lai, 2006; Padilla-Melendez et al., 2008; Wang & Wang, 2009). However, PEOU is criticised as a measure of system quality because PEOU does not capture the system quality construct in its entirety (Petter, DeLone, & McLean, 2008). On the other hand, researchers using the IS success model (DeLone & McLean, 2003) for conceptualising e-Learning systems success, hypothesised system quality as a determinant of system use and user satisfaction (Adeyinka & Mutula, 2010; Holsapple & LeePost, 2006; Wang et al., 2007). In these studies, system quality was operationalised with ease of use, user friendliness, reliability, and responsiveness.

In this research, quality of the e-Learning system is categorised as an organisational dimension within the e-Learning systems success framework (see Figure 2.5) because the e-Learning system is provided to its users by the organisation.

2.4.3 Instructor dimensions

This section presents instructor dimensions of e-Learning systems success. For each dimension, I present the conceptualisation of the construct used in the present study; this is followed by introducing the literature on which the conceptualisation is based.

2.4.3.1 Instructor use of the e-Learning system

Instructor use of the e-Learning system refers to the extent to which an instructor uses the functionalities provided by the e-Learnng system (in other words, to the usage of the e-Learning system by the instructor). System usage is a widely applied measure of IS success. Indeed, IS success is often defined as the degree to which a system is accepted and used (Davis, 1989) and user acceptance and usage is an important measure (DeLone & McLean, 1992). Without consideration of user behaviour regarding acceptance and usage of a system, even the best systems cannot be successful. The TAM was developed and used to predict and explain technology acceptance and use behaviours in various IS domains (Davis & Venkatesh, 1996; Dishaw & Stong, 1999; Legris, Ingham, & Collerette, 2003; Straub & Gefen, 1997). The constructs used to measure user acceptance behaviour were intention to use (willingness to use the system) and use (actual usage behaviour), with intention to use commonly used as a proxy for actual use (Davis, 1989). There are many variations of the TAM, with the common aspect being that perceived usefulness (PU) and perceived ease of use (PEOU) are hypothesised as main predictors of use (or intention to use).

Researchers have evaluated e-Learning systems success in terms of user acceptance and usage behaviour (Behrens, Jamieson, Jones, & Cranston, 2005; Lee et al., 2009; Liu, Liao, & Pratt, 2009; Mahdizadeh et al., 2008; Park, 2009; Sanchez-Francisco, Martinez-Lopez, & Martin-Velicia, 2009). Models to measure technology acceptance behaviour in business organisations were used in the higher education context to measure e-Learning acceptance and usage, as e-Learning is also another kind of IS (Lee & Lee, 2008). e-Learning researchers have placed great emphasis on the TAM, developed by Davis (1989), for research in the context of e-Learning acceptance. The majority of studies extended the TAM with different constructs to identify how these constructs affect the intention to use e-Learning systems and the e-Learning usage behaviour (Behrens et al., 2005; Lau & Woods, 2009; Lee et al., 2009; Ong, Lai, & Wang, 2004; Pituch & Lee, 2006).

While most of the studies attempting to predict e-Learning system usage focused on learners, there are a number of studies that focused on instructors. Mahdizadeh et al.'s (2008) study focused on the impact of instructors' perceptions of the e-Learning environment and the added value of e-Learning environments on instructors' use of e-Learning. The study found that actual use was significantly influenced by the added value of e-Learning environments which, in turn, was influenced by instructors' perceptions of the e-Learning environment. Teo, Lee, Chai, and Wong (2009) attempted to examine the validity of the TAM among pre-service teachers in Singapore and Malaysia and found that TAM is a robust model in predicting the intention to use technology in an educational context.

System use is operationalised in many different ways in research (Chen, 2010). Some studies examined instructor use of various specific technologies in their teaching. However, many studies examined use in more generic terms, such as frequency of system use without considering specific functionality. Chen examined how instructor use of technology supports student-centred learning. They defined the system use by the instructor as the sum of learning opportunities provided to the learners by the instructors via the system. Wang and Wang (2009) studied instructor adoption of e-Learning systems by integrating constructs from both the widely accepted IS success model (DeLone & McLean, 2003) and the TAM (Davis, 1989). In their study, both intention to use and system use were examined to measure instructor adoption of e-Learning systems. The final dependent variable in their model was system use, while intention to use was the determinant of system use. They found a strong relationship between intention to use and system use. System use was measured by the extent to which instructors utilised the functions of the e-Learning system. Other researchers (Thomas & Stratton, 2006; Almekhlafi & Almeqdadi, 2010) considered e-Learning system use by instructors in their descriptive studies. Condie and Livingston (2007) examined system use as an antecedent to individual impact, studying the impact of teacher usage of various features of the e-Learning system on quality of teaching.

Even when system use is mandatory, the extent of use, interpreted as the level of sophistication and the intensity of use, are likely to differ from user to user, with the variation having effect on the extent to which the intended benefits are achieved. In practice, it is not possible to regulate every aspect of system use (DeLone & McLean, 2003); system use may be mandatory up to a certain level, but the continued use and the use of different (particularly, advanced) functionalities of the system tend to remain discretionary. Thus, system use, understood as the extent of use, is a measure of success under mandatory use, as well as under discretionary use.

Although most of the studies focus on the learner perspective, system usage by the instructors is also important in making the e-Learning initiative a success. Thus, in this research, system use was considered as an e-Learning success dimension. This dimension is categorised as an instructor dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.3.2 Instructor satisfaction

Instructor satisfaction refers to the extent to which the e-Learning system meets the instructor's expectations. User satisfaction is a commonly used construct in evaluating IS success (Baily & Pearson, 1983; Doll & Torkzadeh, 1988). A number of instruments were developed to measure user satisfaction, including the widely used instrument by Bailey and Pearson. The comprehensive review of early IS success literature by DeLone and McLean (1992), covering 180 journal articles, revealed that user satisfaction dimension was the most widely used measure of IS success up until that time.

Similarly, instructor satisfaction is considered an important construct in developing and implementing successful e-Learning systems (Bolliger & Wasilik, 2009; Wasilik & Bolliger, 2009), with Sloan Consortium (Lorenzo & Moore, 2000) including it as one of the five pillars of quality online education. Instructor satisfaction is an influential construct in providing learners with high quality learning experiences, as shown by Wasilik and Bolliger. The study was based on 102 online instructors' responses to an online faculty satisfaction survey in a university in the United States. One other study, by Yengin et al. (2011), highlighted the importance of instructor satisfaction in achieving e-Learning systems success. Based on the IS success model (DeLone & McLean, 2003), the researchers formulated an e-Learning systems success model for instructors, taking instructor satisfaction as a dependent variable to measure e-Learning systems success. However, the model formulated by Yengin et al. was not empirically validated.

The review of literature highlights the fact that user satisfaction is one of the most frequently reported success measures in e-Learning systems success research. However, although the instructor plays a critical role in implementing successful e-Learning systems, there is little e-Learning systems success research that is focused on evaluating instructor (rather than learner) satisfaction. Thus, in this research, instructor satisfaction is included as another dimension. Instructor satisfaction is categorised as an instructor dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.3.3 Quality of the e-Learning content

Quality of the e-Learning content refers to the quality of content provided by the instructor to learners via the e-Learning system. Quality of the e-Learning content is another dimension commonly used in studies of e-Learning systems success (Chen, 2010; Chen, et al., 2009; Roca, Chiu, & Martinez, 2006; Sun et al., 2008; Wang et al., 2007; Ozkan & Koseler, 2009; Ozkan et al., 2009). In previous research, e-Learning content quality was used as an independent construct affecting one or more of the dependent constructs. Similarly, quality of information produced by ISs was commonly studied in ISs contexts (DeLone & McLean, 2003; Wang, 2008) and found to be an antecedent to system use and user satisfaction (DeLone & McLean, 2003).

Content quality in e-Learning has been hypothesised as an antecedent to learner satisfaction and system use by the learners (Le & Lee, 2008; Naveh, Tubin, & Pliskin, 2010; Sun et al., 2008; Wang et al., 2007). Wang et al. developed and validated measurement scales for six IS success dimensions (information quality, system quality, service quality, system use, user satisfaction, and net benefits) in the e-Learning systems context. They used the same construct name of information quality in their model to represent quality of the content provided via the e-Learning system. Wang et al. operationalised the information quality construct with six items measuring timeliness, accuracy, and relevance. Holsapple and LeePost (2006) and Lin (2007) tested the IS success model (DeLone & McLean, 2003) in an e-Learning context where the content quality construct was defined in a way similar to Wang et al. More recently, Wang and Chiu (2011) hypothesised that information quality affects user satisfaction in a study covering 12 web based courses at a university in Taiwan. However, the findings did not support the hypothesised relationship.

In some studies of e-Learning use (Lin, 2007; Lin & Wang, 2011), information quality was examined as a determinant of intention to use, while others hypothesised information quality as an antecedent to perceived usefulness (Wang & Wang, 2009). Dennen, Darabi, and Smith (2007) found that e-Learning content quality was a predictor of system use by learners.

This section highlights the importance of quality of the e-Learning content as a determinant of e-Learning systems success. Thus, in this research, quality of the e-Learning content was considered as an e-Learning success dimension (see Figure 2.5). The quality of the e-Learning content dimension was categorised under instructor dimensions within the e-Learning systems success framework because e-Learning content is developed by the instructor.

2.4.3.4 *Quality of the instructor support to learners*

Quality of the instructor support to learners refers to the quality of support, such as responding to student queries, provided by the instructor to learners via the e-Learning system. Another construct identified as a determinant of e-Learning systems success is quality of the instructor support provided to learners via the e-Learning system. Several recent studies (Chiu, Chiu, et al., 2007; Holsapple & LeePost, 2006; Lee & Lee, 2008; Wang et al., 2007) conceptualised the service quality dimension used in IS literature in the e-Learning context as the instructor support to learners. In the Holsapple and LeePost study, the researchers attempted to develop a multidimensional model of e-Learning systems success based on the IS success model. They emphasised the importance of quality of the instructor support to learners in terms of increasing learner motivation to use the e-Learning system. Selim (2007) examined critical success factors for e-Learning systems acceptance by learners. The study identified instructor support as a critical success factor for e-Learning acceptance, operationalising the construct with 13 items to measure instructor teaching style and control of e-Learning tools. The finding of Selim was further supported by Ozkan and Koseler’s (2009) study, which reported that the quality of the instructor support to learners (i.e. the instructor responds to learners rapidly, his/her teaching style is good, and his/her explanations are clear, and he/she has control over technology) is a critical construct influencing e-Learning systems success. Ozkan and Koseler identified instructor support to learners as a determinant of learner satisfaction while Selim looked at it as a determinant of e-Learning systems acceptance by learners.

Instructor support to learners results in learner satisfaction (Arbaugh, 2001; Coppola, Hiltz, & Rotter, 2002; Dennen et al., 2007; Easton, 2003; Fredericksen, Pickett, Pelz, Shea, & Swan, 2000; Hammoud, Love, & Brin 2008; Hong, 2002; Marks, Sibley, & Arbaugh, 2005; Martins & Kellermanns, 2004; Petruzzellis et al., 2006; Swan, Shea, Fredericksen, Pickett, Pelz, & Maher, 2000). Dennen et al. examined the importance of instructor-student interactions in an online learning environment by recruiting instructors and students from two universities. The findings of the study suggested that both proactive (expectations) and reactive (feedback) information from instructor to students strongly affects student satisfaction. Similarly, several other studies suggested that student interaction with the instructor was an important determinant of student satisfaction (Arbaugh, 2000; McGorry, 2003; Ozkan & Koseler, 2009; Sher, 2009; Sun et al., 2008). Lee and Lee (2008) formulated an e-Learning systems success model based on the IS success model (DeLone & McLean, 2003). They operationalised the service quality dimension with eight items measuring instructor commitment, instructor ability, and friendliness.

Therefore, in this research, quality of the instructor support to learners is categorised as an instructor dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.3.5 Instructor self-efficacy

Instructor self-efficacy refers to the extent to which the instructor believes that she has the ability to effectively use the e-Learning system to promote and to manage learning by learners. Self-efficacy is defined as individuals' judgment of their abilities to plan and carry out the necessary behaviours in order to achieve specific goals (Bandura, 1997). Self-efficacy is an important construct in determining an individual's behavioural intention and actual behaviour (Hwang & Yi, 2002). Compeau, Higgins, and Huff (1999) found that self-efficacy was a significant predictor of use and affect as seen in their longitudinal study to determine the relationship between self-efficacy, outcome expectations, affect and anxiety. Accordingly, they suggested that self-efficacy is a determinant of system usage behaviour and of the affective responses of an individual towards information technology. Self-efficacy is an important determinant of system usage (Liaw, Huang, & Chen, 2007; Saleh, 2008; Wang & Wang, 2009). Liaw et al.'s study examined the perceptions of 30 university instructors and found that instructor behavioural intention to use e-Learning systems is significantly influenced by instructor self-efficacy. Similarly, several other researchers (Durucu & Calisir, 2009; Chen, 2010; Faseyitan, Libii, & Hirschbuhl, 1996; Kagima & Hausafus, 2000; Paraskeva, Bouta, & Papagianni, 2008; Saleh, 2008) studied the impact of self-efficacy on instructor adoption of technology. The results were consistent with the findings of the Liaw et al. study.

In an attempt to study instructor adoption of web-based learning, Wang and Wang (2009) developed a model integrating the TAM (Davis, 1989) and the IS success model (DeLone & McLean, 2003). In Wang and Wang's study involving instructors in a Taiwan university, instructor self-efficacy was hypothesised as a predictor of perceived ease of use and intention to use the web-based system. The self-efficacy construct was operationalised with five items that measured the instructor's confidence in using the web-based system. Their findings suggest that instructor self-efficacy is a determinant of perceived ease of use but not behavioural intention to use. In contrast to the results of Wang and Wang, Smarkola (2008) found that instructor self-efficacy is an important predictor of an instructor's behavioural intention to use technology.

Therefore, in this research, instructor self-efficacy was categorised as an instructor dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.4 Learner dimensions

This section presents learner dimensions of e-Learning systems success. For each dimension, I present the conceptualisation of the construct used in the present study; this is followed by introducing the literature on which the conceptualisation is based.

2.4.4.1 Learner use of the e-Learning system

Learner use of the e-Learning system refers to the extent to which the learner is using the e-Learning system for learning. Researchers have conceptualised e-Learning system success via the actual or self-reported use of the e-Learning system (Pituch & Lee, 2006; Raaij & Schepers, 2008). Raaij and Schepers investigated how individual differences affect the level of system use of a virtual learning environment. Carswell and Venkatesh (2002) identified three acceptance outcomes, namely, involvement, engagement, and use of different media, in their study where they examined how motivational behavioural constructs determine the success of web based asynchronous learning environments. They employed the theory of planned behaviour from phychology (Ajzen, 1985, 1991) and innovation diffusion theory from organisation science (Rogers, 1995) to develop their integrated model. The study concluded that the usage behaviour was predicted by individual motivational constructs. Further, Lee

(2006) examined the usage behaviour in different settings (mandatory and voluntary use) and concluded that initial mandatory usage is necessary for e-Learning adoption. On the other hand, several other studies investigated both the intention to use and the use of e-Learning systems (Lau & Woods, 2009; Ngai, Poon, & Chan, 2007), and confirmed that the intention to use is a strong predictor of actual use.

Some of the prior studies examined usage behaviour using the IS Success Model (DeLone & McLean, 2003) as a theoretical basis. These studies considered information quality, system quality, and service quality as direct antecedents of system usage (Holsapple & LeePost, 2006; Lin, 2007). Holsapple and LeePost studied the extent to which the course elements are actually used by the learners. In Lin's study, the behavioural intention to use and the actual use were examined with three quality dimensions (information quality, system quality, and service quality) to identify the antecedents of online learning system usage. Wang et al. (2007) validated the constructs of the IS success model (DeLone & McLean, 2003) in the e-Learning context with a sample of managers in multinational companies. In their study, the system use dimension was operationalised with frequency of use and the nature of use (voluntary or mandatory).

In view of the strong empirical support in prior studies, in this research, learner use of the e-Learning system was categorised as a learner dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.4.2 Learner satisfaction

Learner satisfaction refers to the extent to which e-Learning via the e-Learning system meets the learner's expectations. Learner satisfaction is widely used as a construct in e-Learning systems success research. The level of user satisfaction is related to a user's willingness to continue using new technology (Kim & Malhotra, 2005).

Much of the recent research on e-Learning systems success used learner satisfaction as the dependent variable (Ferguson & DeFelice, 2010; Paechter, Maier, & Macher, 2010; Palmer & Holt, 2009; Lee & Rha, 2009; Saade, 2007; Sun et al., 2008). The literature highlights the importance of assessing and understanding learner satisfaction in online learning environments.

Some studies have examined the mediating effect of the learner satisfaction construct, with a set of antecedent variables and e-Learning continuance intention as the dependent construct (Chiu, Hsu, Sun, Lin, & Sun, 2005; Roca et al., 2006, Roca & Gagne, 2008; Wang & Chiu, 2011). The researchers developed models of e-Learning systems success by extending or combining well accepted models from IS literature (the TAM and the IS success model). The findings of these studies indicate that learner intention to continue using e-Learning systems is influenced by the level of learner satisfaction. Chiu, Chiu, et al. (2007) emphasised that learner satisfaction and learner intention to continue using e-Learning in the future are important determinants of system success.

Taken together, these studies suggest that learner satisfaction is an important dimension of e-Learning systems success. Therefore, in this research, learner satisfaction is included as a learner dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.4.3 Level of learning

Level of learning refers to the quality of learning attained by the learner. Student learning is a construct frequently used in evaluating the success of online learning environments (Arbaugh, 2000, 2001; Ferguson & DeFelice, 2010; McGorry, 2003; Santhanam, Sasidharan, & Webster, 2008; Sher, 2009; Wang, 2003; Wu, Tennyson, & Hsia, 2010; Yukselturk & Bulut, 2007). Chou & Liu (2005) defined student learning as the extent to which learning goals (target knowledge and skills) are achieved by students. e-Learning researchers typically evaluate student learning or learning effectiveness by looking at student performance (Arbaugh, 2000; Chou & Liu, 2005; Piccoli, Ahmad, & Ives, 2001). However, Norman and Spoher (1996) asserted that using a single parameter (test marks) to measure the quality of student learning may not be appropriate because of the complexity of the construct (as reflected, for example, in Bloom's taxonomy of learning objectives, Bloom, 1956). According to Colquitt, LePine, and Noe (2000), the student learning construct needs to reflect both knowledge transfer and knowledge retention.

Different researchers operationalised the student learning construct differently. Eom, Wen, and Ashill (2006) examined the determinants of students' perceived learning in an online learning environment. The student learning construct was operationalised with three items to gather student opinions about whether they had learnt more in online learning and the learning experience gained when compared to a face-to-face version of the course. Many of the studies used educational test scores to measure learning effectiveness. Chou and Liu (2005) measured learning performance with final test grades in their study to evaluate learning effectiveness in web-based learning environments. In another study, Johnson, Hornik, and Salas (2008) studied the success of an e-Learning environment through learning effectiveness measured using the total scores obtained for end of module quizzes. Zhang, Zhou, Briggs, and Nunamaker (2006) studied the impact of interactivity on learning effectiveness, measuring learning effectiveness with educational test scores. McGill and Klobas (2009) proposed a model of task-technology fit to understand the determinants of student learning in an e-Learning environment. They operationalised perceived impact of the e-Learning environment on learning with three items, but measured learning effectiveness via student grades for a test.

However, Alavi (1994) and Rovai, Wighting, Baker, and Grooms (2009) used multiple measurement items to capture student skill development. Alavi emphasised the importance of investigating the impact of technology on education or more specifically on student learning. The author examined the effectiveness of computer mediated collaborative learning in terms of student learning and evaluation of the classroom experience. The study participants were 127 MBA students enrolled in three core courses in management information systems of which 79 students attended a class with a group decision support system and 48 were in a traditional classroom. The study reported that students involved with group learning activities in the computer mediated environment gained a higher level of learning, higher level of skill developed, and higher level of interest in learning than the students involved in the traditional environment. At the same time, students in the computer mediated environment had a more positive class experience, and their final grades were also higher than their counterparts in the traditional environment. Alavi used multiple items to measure perceived skill development, self-reported learning, and learning interest.

Rovai et al. (2009) developed and validated a self-report measurement instrument that can be used to measure student learning that focused on assessing the extent to which students achieve higher levels of learning. The study participants were university undergraduate students from two universities in the United States. They used a three step process to validate the measurement items. In the first phase, an exploratory factor analysis was performed on an 80 item instrument based on 142 responses. In the second phase, the items were reduced to 21. The new measurement scale was administered to 171 students for confirmatory factor analysis. In the third phase, the measurement scale was reduced to nine items. In this phase, they tested the scale with 221 students. The final nine item self-reported scales represented perceived cognitive, affective, and psychomotor learning.

Several studies using the IS success model to explain e-Learning systems success also utilised the student learning construct as a success measure. Lee and Lee (2008), for example, tested the IS success model with student performance (in terms of marks gained) as the individual impact variable. Additionally, Holsapple and LeePost (2006) and Wang et al. (2007) used student learning as a measurement item to operationalise the net benefits construct (in both of the studies, the items relating to student learning did not address the level of learning as comprehensively as the items in the study by Rovai et al., 2009).

The discussion on student learning has highlighted the wide use of the student learning construct in measuring e-Learning systems success. Therefore, in this research, student learning is categorised as a learner dimension within the e-Learning systems success framework (see Figure 2.5). Student learning is conceptualised following Rovai et al. (2009), emphasising the level of learning achieved.

2.4.4.4 e-Learning continuance intention

e-Learning continuance intention refers to learner intention to continue using e-Learning in the future. e-Learning continuance intention is based on the IS continuance intention introduced by Bhattacherjee (2001) in the general IS success context. The theoretical models developed to examine IS usage were mainly developed for initial acceptance and usage of systems (Ajzen, 1991; Davis, 1989). However, Bhattacherjee argued that while initial acceptance and usage has importance in terms of realising success, long term success depends on continued use rather than first time use. Based on this argument and on findings from IS usage research, a model of IS continuance was developed adapting the expectation confirmation theory from consumer behaviour literature. Bhattacherjee empirically validated the IS continuance intention model in an online banking setting, suggesting that the user continuance intention is determined by their satisfaction with IS use and the perceived usefulness of continued IS use. Continuance intention as a success measure has been applied in different IS contexts (Kim & Mahotra, 2005; Limayem, Hirt, & Cheung, 2007; Vatanasombut, Igbaria, Stylianou, & Rodgers, 2008; Wangpipatwong, Chutimaskul, & Papasratorn, 2008).

To date e-Learning continuance intention has underpinned a few studies in e-Learning success both in the higher education sector (Sorebo, Halvari, Gulli, & Kristiansen, 2009; Wu, Tsai, Chen, & Wu, 2006) and in business organisations (Roca & Gagne, 2008). Chiu et al. (2005) emphasised that user intention to continue using an e-Learning system is a major determinant of e-Learning success. Previous research examined how e-Learning continuance intention is influenced by task value, self-efficacy, usability, quality, and satisfaction. Some researchers (Chiu, Chiu, et al., 2007; Chiu, Sun, et al., 2007; Liao & Lu, 2008; Roca & Gagne, 2008) introduced models to investigate how individual motivational constructs, such as self-efficacy and task value affect learner intention to continue using e-Learning. Another study (Chiu et al., 2005) applied the expectation disconfirmation theory, introduced by Oliver (1980), to examine the influence of cognitive and affective beliefs (usability, quality, value and satisfaction) of learners on their decision to continue using e-Learning systems in the future. Roca et al. (2006) introduced a model intended to explain variations in e-Learning continuance intention based on the theoretical background of the theory of planned behaviour (Ajzen, 1991), the TAM (Davis, 1989), the expectation disconfirmation theory, and user satisfaction.

A number of studies demonstrated that user satisfaction is a strong predictor of e-Learning continuance intention, with users who are satisfied with the initial use of the system having a tendency to continue using it (Chiu et al., 2005; Chiu, Sun, et al., 2007; Lee, 2010; Roca et al., 2006; Tao, Cheng, & Sun, 2009; Wu et al., 2006; Yeung & Jordan, 2007). The above mentioned studies investigated how user behaviour affects learner intention to continue using e-Learning systems in the future (Liao & Lu, 2008), as well as how to manage continuance intentions with respect to using e-Learning systems (Chiu, Chiu, et al. 2007, Chiu, Sun, et al., 2007, Roca & Gagne, 2008).

Therefore, in this research, e-Learning continuance intention is categorised as a learner dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.4.5 Learner self-efficacy

Learner self-efficacy refers to the extent to which the learner believes that she has the ability to effectively use the e-Learning system to learn. A number of studies examined how learner ability and confidence in using e-Learning systems affect their satisfaction and learning (Artino, Rochelle, & Durning, 2010; Lin, Lin, & Laffey, 2008; Pajares & Millers, 1994; Wu et al., 2010; Zimmerman, Bandura, & Martinez, 1992). Artino et al. examined the impact of medical students' motivational beliefs on their academic achievement. The results suggested that learner self-efficacy is an important determinant of academic achievement in e-Learning. This finding is consistent with several other studies (Joo, Bong, & Choi, 2000; Zajacova, Lynch, & Espenshade, 2005). Lin et al. (2008) found that self-efficacy is a determinant of learner satisfaction.

Previous studies found that self-efficacy affects learner use of e-Learning systems (Padilla-Melendez et al., 2008; Roca et al., 2006; Terzis & Economides, 2011). For example, Padilla-Melendez et al. conducted a quantitative study with 225 management students in a university in Spain to test the relationship between perceived self-efficacy and intention to use the system. In their study, self-efficacy had a positive influence on learner intention to use the system, which was consistent with the result by Yi & Hwang (2003). To understand the constructs that affect learner intention to use a computer based assessment, Terzis and Economides developed a model based on the TAM (Davis, 1989). They found that self-efficacy has an indirect impact on computer based assessment use. Wan, Wang, and Haggerty (2008) studied the importance of self-efficacy on student learning and satisfaction. The study was carried out in a large university in China with 383 students participating in online courses. The findings suggest that self-efficacy is a direct determinant of student learning and satisfaction.

Several more recent studies (Artino, 2010; Chiu & Wang, 2008; Liang, Wu, & Tsai, 2011) examined the importance of self-efficacy in determining learner intention to continue e-Learning. These studies found that self-efficacy is a significant predictor of not only initial use but intention to use e-Learning in the future. Artino examined how motivational beliefs (task value and self-efficacy) affect learner satisfaction and intention to take future courses online with 564 undergraduate students. The study findings indicated that self-efficacy is a determinant of learner satisfaction and future intention to continue e-Learning, and this was consistent with the findings of Artino (2009) and Liang et al. (2011). In another study, Chiu and Wang extended the unified theory of acceptance and use of technology (UTAUT) to study learner web-based learning continuance intention. The study was based on 286 responses from students enrolled in web-based courses in a Taiwan university. The findings indicated that computer self-efficacy is a significant predictor of learner intention to continue e-Learning in the future. Most of the studies used multiple items to measure learner self-efficacy, mainly based on the Compeau et al. (1999) study.

The above discussion highlights the significant impact of learner self-efficacy on other e-Learning systems success dimensions: learner satisfaction, student learning, and learner intention to continue e-Learning in future. Therefore, in this research, learner self-efficacy is included as a learner dimension within the e-Learning systems success framework (see Figure 2.5).

2.4.5 e-Learning systems success framework

The review of IS success and e-Learning systems success literature presented in this chapter provided the theoretical foundation for the research. The broad nature of the questions of the research necessitated a wide coverage of literature to provide sufficient understanding of the dimensions of e-Learning systems success. The dimensions of e-Learning systems success identified in the review are summarised in the diagram in Figure 2.5. The areas in the diagram represent the division of e-Learning systems success dimensions into three tiers, and the arrows indicate the overall direction of the flow of causality.

The diagram constitutes a framework for developing models of e-Learning systems success for use in specific contexts. A model of e-Learning systems success is a special case of the model of IS success (DeLone & McLean, 2003; Larsen, 2003; Petter et al., 2008). Namely, it is a set of interrelated dimensions reflecting the relevant facets of e-Learning systems success from the perspective of e-Learning system stakeholders. Thus, for a dimension included in the framework to be seen as valid in a particular context, it has to be tested as a part of an e-Learning systems success model. Therefore, the framework, by summarising the literature, constitutes a source of ideas for e-Learning systems success dimensions appropriate for particular contexts.

To develop a specific model, the relevant dimensions are to be adopted from the framework (possibly also including context-specific dimensions not included in the framework), and specific hypotheses are to be developed, with overall direction of the hypotheses likely to coincide with the arrows in the diagram. The framework is validated in the subsequent chapters of this thesis, where it is used to formulate two e-Learning success models that are then validated against survey data.

The framework can be seen as a descriptive model according to the classification of types of models relevant to management information systems research provided by Gregor (2006).

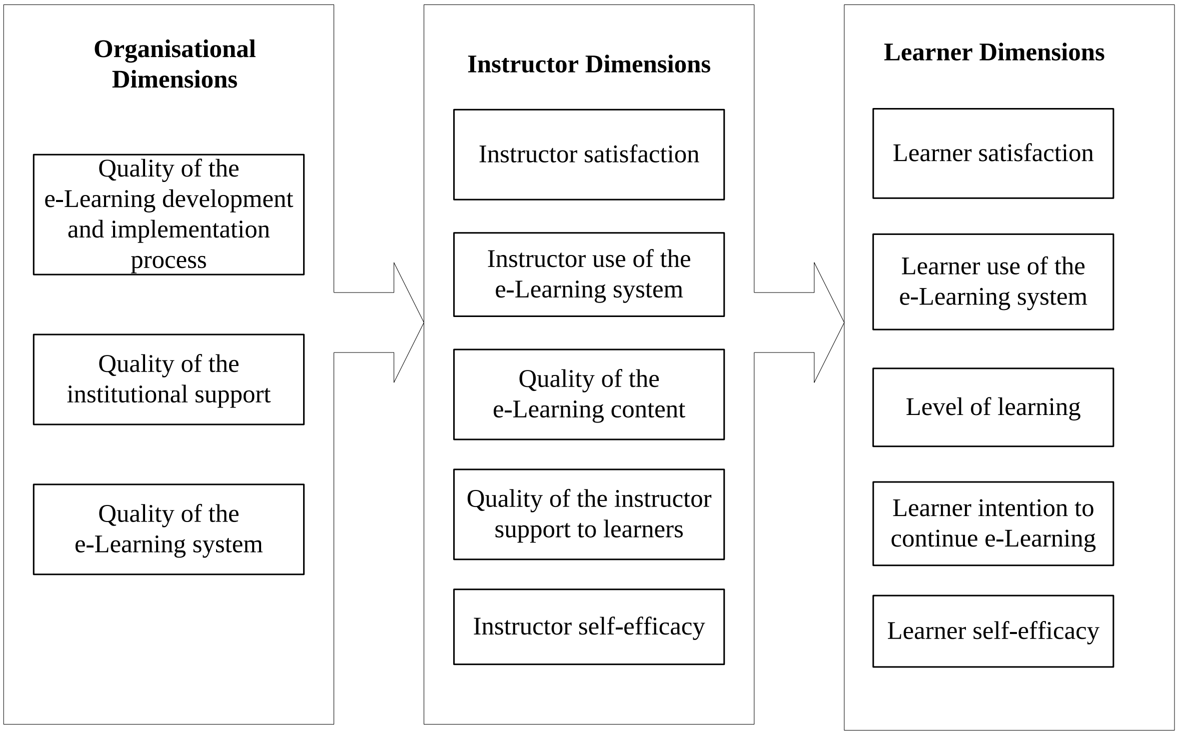


Figure 2.5 e-Learning systems success framework formulated based on the literature.

2.5 Multidimensional e-Learning systems success models

The purpose of this section is to present an overview of prior studies that have attempted to develop multidimensional models of e-Learning systems success. Therefore, whereas the previous section addresses individual dimensions, this section focuses on past attempts to formulate multidimensional models combining these dimensions. I follow DeLone and McLean (1992) in defining a multidimensional model as a model employing multiple dimensions and the relationships between them with the intent to represent the important facets of the success of a system (in this research, e-Learning system) as a whole, rather than to focus on a particular construct relevant to system success (such as learner satisfaction). A multidimensional model is intended to be of relevance for a broad range of management decisions, rather than for decisions relating to a specific construct. Thus, what distinguishes a multidimensional model is not the number of constructs included in the model, but the intent to represent a holistic picture.

Moreover, because the present study focuses in particular on organisational context and on e-Learning systems success, I covered only the models that included organisational dimensions (as described by the framework in Figure 2.5), and only the models that covered success outcomes in terms of either learning or in terms of behaviours and attitudes relevant to learning. Therefore, for example, the study by Liaw, Huang, and Chen (2007) that focused on instructor attitudes but did not cover any constructs from the organisational context is not covered.

All of the existing attempts to formulate and test e-Learning systems success models (fulfilling the criteria stated earlier in this section) that I found in the literature were based either on the DeLone and McLean model of IS success (DeLone & McLean, 2003) directly, or on the related task technology fit model (Godhue & Thompson, 1995). Therefore, in the rest of this section, I first discuss the DeLone and McLean model and the task technology fit model, and then discuss their applications in e-Learning systems success studies.

As described in section 2.2, the research models of the present study were based on literature published before January 1 2009. Therefore, I distinguish studies published before January 1 2009 and after January 1 2009 by introducing them in separate sections.

2.5.1 DeLone and McLean's IS success model

Ultimately, IS success is the extent to which a system achieves the goals for which it was designed (DeLone & McLean, 1992). Measuring such an extent is difficult due to the differences between systems and between the views of the stakeholders of a particular system. Therefore, DeLone and McLean (1992), based on a review of the literature available at the time, created a multidimensional model involving generic constructs that represent IS success over a range of contexts. These constructs are seen as dimensions of IS success. Reviews of literature on IS success (not including e-Learning systems) revealed the dominance and the continued relevance of the IS success model (Larsen, 2003; Petter, DeLone, & McLean, 2008; Petter & McLean, 2009). In particular, the meta-analytical study by Petter and McLean demonstrated the support for the relationships suggested by the model across a broad range of contexts.

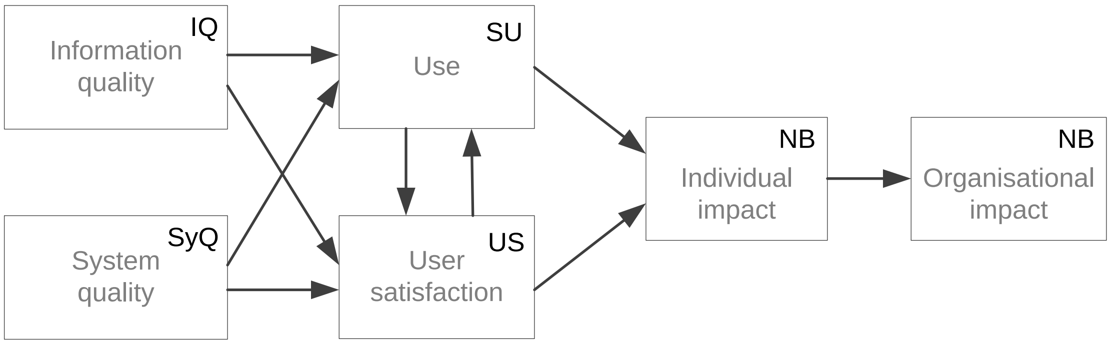


Figure 2.6 Initial IS success model (DeLone & McLean, 1992, p. 87).

The initial DeLone and McLean (1992) IS success model (see Figure 2.6) included six dimensions of IS success and the relationships between them. The revised version of the model (DeLone & McLean, 2003) added the dimension of service quality and replaced the individual impact and organisational impact dimensions with the net benefits dimension (see Figure 2.7). The model has been used as a basis for e-Learning systems success models, as discussed in the following sections (sections 2.5.3 and 2.5.4).

In the two versions of the model, the outcome variables (individual and organisational impact and net benefits) require most adaptation from context to context, and are, effectively, used to check the nomological validity of the rest of the dimensions.

It should be noted that the view that use and user satisfaction result in net benefits is, even though common, not necessarily applicable to all situations. Net benefits (or, more precisely, their perceptions) can result in user satisfaction and in further system use. This is a perspective adopted in the study by Wu and Wang (2006), who tested a model hypothesising that perceived benefits of using a knowledge management system result in user satisfaction and in system use and confirmed both of the hypotheses, with strong effect sizes. However, the study did not provide a strong argument to support the direction of the effects they hypothesised. The present study takes a view that the net benefits of using e-learning systems are not clearly visible to the users (instructors or learners); therefore, benefits are a result, rather than a precursor of user behaviours and perceptions. One may argue, though, that because (in most studies, including the present study) the benefits are measured by surveying the users, what is actually measured are perceived benefits, which may affect satisfaction and behaviour. To clearly distinguish causes and effects, longitudinal and (ultimately) experimental studies are needed; conducting experimental or longitudinal research, however, was not feasible in the present study, which is noted as a limitation of the research.

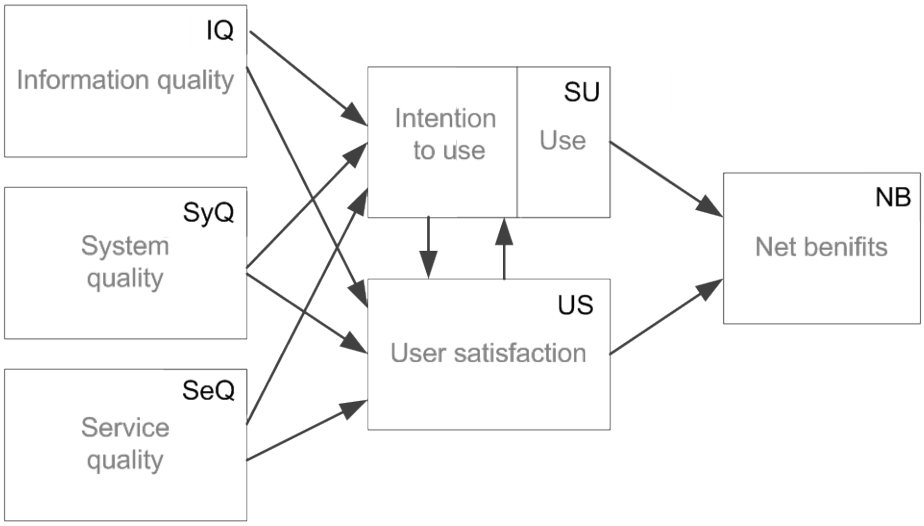


Figure 2.7 DeLone and McLean’s updated IS success model (2003, p.24).

2.5.2 Task technology fit model

Based on the assertion that technology fit to the intended task contributes to individual performance both directly and via increased technology use, Godhue and Thompson (1995) developed a model explaining individual performance attributable to information technology. The task-technology fit model (see Figure 2.8) was based on the DeLone and McLean (1992) IS success model (the two models are compared in Table 2.1). Similarly to the DeLone and McLean, the task-technology fit model emphasises individual performance impact as an important dimension; nonetheless, it does not consider organisational impact. (More precisely, individual impact from DeLone and McLean is replaced by a highly related, but narrower construct of performance impact, which can be seen as the aspect of individual impact that is most pertinent to the organisation.)

The task-technology fit model replaces user satisfaction with a broader concept (the concept of *precursors to utilisation*) intended to capture a wide range of user attitudes to technology, including affect (overall positive or negative feelings about the technology), social norms (perceptions regarding expectations of significant others), and facilitating conditions (perceptions regarding the availability of help and support in using technology).

The central construct in task-technology fit model, task-technology fit, is similar to system quality and information quality in DeLone and McLean (1992), with one important difference—in the spirit of the contingency theory (Woodward, 1958), the focus is not on how well the system performs in general, but on how suited the system is to supporting particular tasks faced by the individual. Thus, task-technology fit has a potential to better account for the role of technology in enabling individuals to perform tasks than the DeLone and McLean IS success model. Task-technology fit is hypothesised to be determined by task, technology, and individual characteristics.

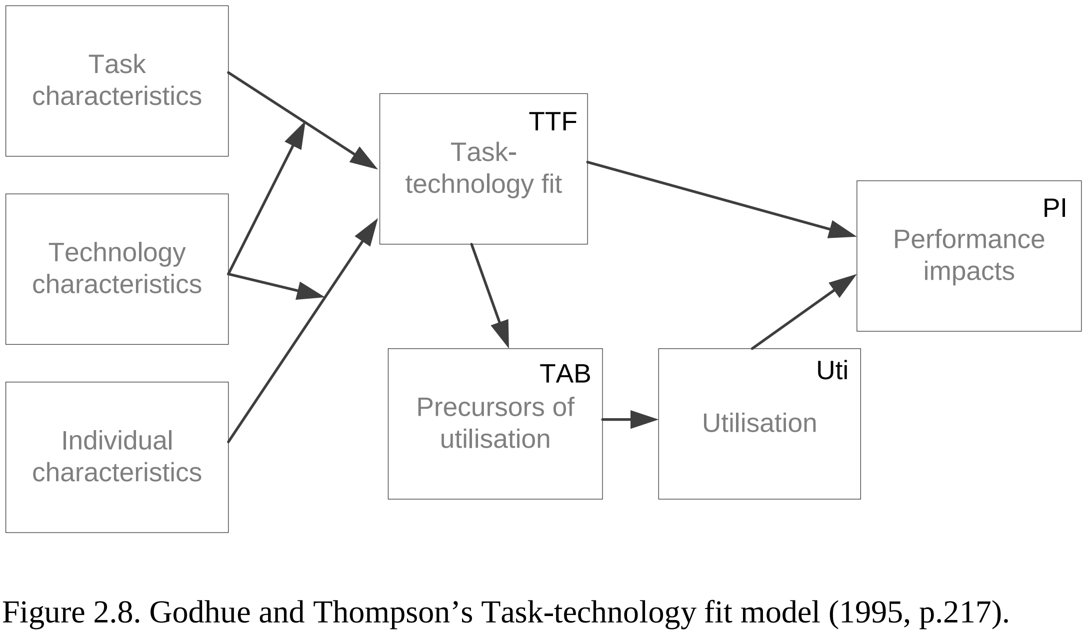


Figure 2.8. Godhue and Thompson’s Task-technology fit model (1995, p.217).

Similarly to DeLone and McLean (1992), the task technology fit model has been used as a basis for e-Learning systems success models, as discussed in the following section (section 2.5.3).

One would expect the task technology fit model to be particularly powerful at describing behaviour when focusing on a specific task, rather than on a range of tasks. Nonetheless, both the test of the model by Godhue and Thompson (1995) (in the study that introduced it), and all of the applications of the model to e-Learning systems focused on the task technology fit of a range of tasks (essentially, of all reasonable tasks enabled by the system).

Table 2.1. Constructs of task technology fit model matched against similar constructs in DeLone and McLean IS success model

Task technology fit model	IS Success Model by DeLone and McLean (1992)
Task technology fit	System quality
Task technology fit	Information quality
Precursors to utilisation	User satisfaction
Utilisation	System use
Performance impacts	Individual impact
Task characteristics	-
Technology characteristics	-
Individual characteristics	-
-	Organisational impact

Note. A dash (-) indicates that no matching construct was found.

2.5.3 e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model—studies that appeared before January 1 2009

This section, in chronological order, discusses the existing multidimensional models of e-Learning systems success based on the DeLone and McLean's IS success model and on task technology fit model published before January 2009. The section is concluded by an overview of the models (see section 2.5.3.6 and Tables 2.2, 2.3, and 2.4).

2.5.3.1 *Changes in success dimensions over the life of an e-Learning implementation project*

Holsapple and LeePost (2006) and LeePost (2009) formulated an e-Learning success model from the learner perspective and included constructs and assumed relationships identical to the IS success model. They posited that the overall success of an e-Learning initiative depends on the attainment of success at each stage of an e-Learning development process: design, delivery, and outcome, over a number of iterations. They operationalised the constructs in the model with items formulated to fit the specific context of e-Learning system development (the exact procedure used to derive the items is not presented in the article). The reliability of the constructs was confirmed via Cronbach alpha values.

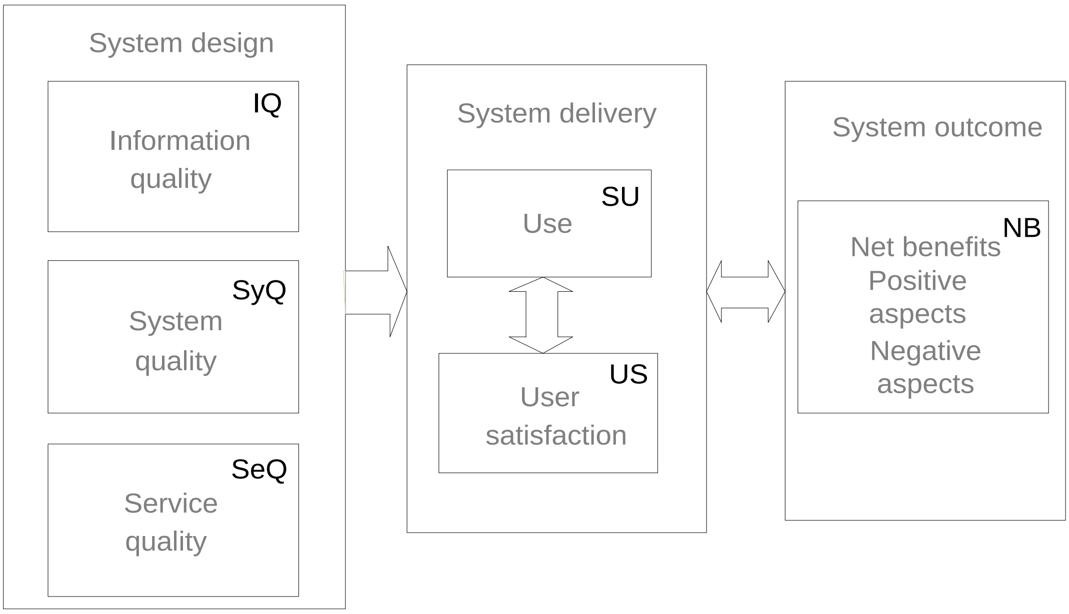


Figure 2.9 e-Learning systems success model by Holsapple and LeePost (2006, p.71).

The model was tested with undergraduate students enrolled in a quantitative methods course at a university in the United States. The authors used the model to study the dynamics of success dimensions over the life of an e-Learning system development project. Holsapple and Lee-Post (2006) and LeePost (2009) did not validate the model against the data. Rather, they treated the evolution of ratings obtained for the dimensions of the model over the life of the project as descriptive data. The number of participants was relatively small (less than 75), and statistical significance tests were not conducted, so that it is difficult to tell if changes observed were due to random fluctuations, or if they did reflect underlying substantive changes.

The authors identified the model's student-centred approach as a limitation in their study. Thus, they suggested extending the e-Learning systems success model to cover the instructor perspective in future research.

2.5.3.2 A model incorporating fairness constructs

Chiu, Chiu, et al. (2007) extended the IS success model by incorporating fairness attributes, namely distributed fairness, procedural fairness, and interactional fairness. Some of the relationships suggested in the basic IS success model were not included (in particular, the system use construct had no antecedents), with no clear justification. Net benefits were interpreted as continuance intention with respect to using the e-Learning system. All of the three fairness constructs were hypothesised to affect both satisfaction and continuance intention. The measures were adapted from a number of literature sources and were pre-tested with six experts in the IS area and pilot tested with 20 master level students for content validity.

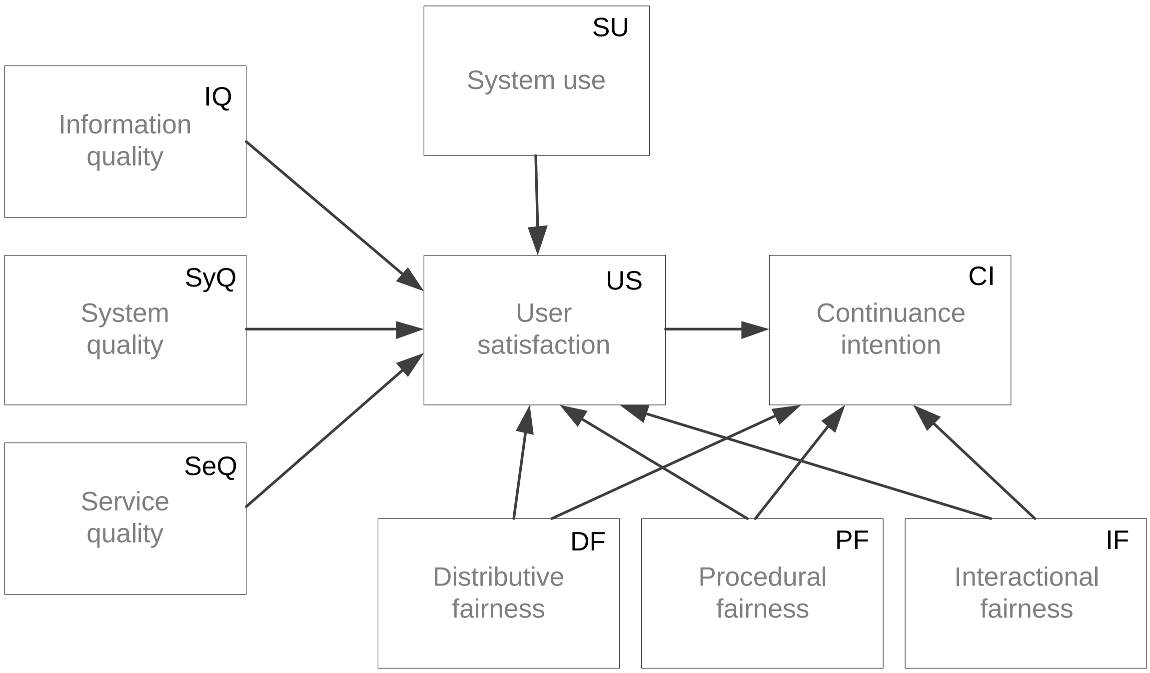


Figure 2.10 e-Learning systems success model by Chiu, Chiu, et al. (2007, p.273).

The model was tested with students at a university in Taiwan. All of the participants had experience of taking at least one web based course. With 2500 of potential participants contacted, 289 usable responses were obtained (thus, the response rate was 11.6%).

The model was tested using a co-variance based technique, with the measurement model tested separately from the structural model. Convergent and discriminant validity were confirmed via composite reliability and square root of average variance extracted (AVE) (these techniques are discussed in section 5.6.2). The overall model fit of the measurement model was adequate. There was no need to make adjustments to the measurement model (e.g., by dropping items).

The overall fit of the structural model was also adequate. For the structural model, path coefficients and their statistical significance were reported. Information quality, system quality, and system use affected satisfaction. In terms of the effect size, the effect on satisfaction of information quality ($\beta = .20$) and system use ($\beta =.21$) was stronger than the effect of system quality ($\beta = .15$). Satisfaction had a strong effect on continuance intention ($\beta = .86$). The effect of service quality on satisfaction was not significant. In addition to the IS success model constructs, distributive fairness and interactional fairness affected satisfaction ($\beta = .24$ and $\beta = .17$, respectively), while procedural fairness affected continuance intention ($\beta = .11$).

It should be noted that the way service quality was operationalised was somewhat inconsistent with the DeLone and McLean (2003) model, as it was interpreted as service provided by the software (e-Learning site), rather than by the IT department. On the other hand, the content of procedural fairness and interactional fairness was such that these constructs described the quality of service provided by the instructor. The content of the distributive fairness construct (that had the highest effect) reflected students' opinions about the grades they received. According to the R-square value, the model predicted 75% of variance in e-Learning continuance intention, which represented net benefits in the model.

The strong effect of user satisfaction on continuance intention discovered in the study by Chiu, Chiu et al. (2007) is consistent with the strong effect of user satisfaction on member loyalty discovered in the study by Lin and Lee (2006). Lin and Lee used a model based on the DeLone and McLean (2003) success model to study member loyalty in online communities (asynchronous communication systems used by online communities provide functionality similar to discussion forum functionality provided by LMS). The study was based on a survey of online community members from a range of online communities in Taiwan. User satisfaction affected member loyalty with a strong effect size, and was the strongest effect discovered.

Nonetheless, the study by Sorebo, Halvari, Gulli, and Kristiansen (2009), which considered the effects of instructor perceptions on intention to continue e-Learning found the direct effect of teacher satisfaction on intention to continue e-Learning not statistically significant. This was, most likely, because of the way their model was structured—satisfaction was hypothesised to directly affect intention to continue along with perceived usefulness. Technology acceptance model studies found quite consistently that when perceived usefulness is hypothesised to affect system use or intention to use, it tends to explain more variance than other variables (Venkatesh, Morris, Davis, G. B., & Davis, F. D., 2003). The result in the study by Sorebo et al. was consistent with these findings.

2.5.3.3 A measurement model

Wang et al. (2007) validated the measurement model for the DeLone and McLean's (2003) model in the e-Learning context from the learner perspective. The constructs in the model were identical to the constructs in DeLone and McLean's IS success model (Figure 2.6), while the items were adapted for an e-Learning context. The scale validation was carried out with a sample of 206 top level managers, middle level managers, first level managers, and professional employees who had e-Learning experience as learners in multi-national organisations in Taiwan. The items were selected based on previous studies on IS success, IS performance, web success, e-Learner satisfaction, user information satisfaction, end-user computing satisfaction, web user satisfaction, system use, IS service quality, web quality, and organisational benefits. The fit of the measurement model was acceptable (Kline, 2011); no adjustments to the model were necessary based on fitting the model to the data. I did not find any published research that would rely on the measure developed by Wang et al., so that its nomological validity remains untested.

2.5.3.4 A model incorporating self-regulatory efficacy

Lee and Lee (2008) formulated an e-Learning success model from the learner perspective (based on the DeLone and McLean, 2003, IS success model), in which they incorporated self-regulatory efficacy as a moderating variable. Self-regulatory efficacy was defined as the ability of self-regulatory learning (measured via self-report). They interpreted net benefits as (self-reported) academic performance.

In the model, the structure of the IS success model was modified, with neither use nor intention to use included in the model. The justification for that was not entirely convincing, as the changes were not justified by the specifics of e-Learning systems. The base IS success model is rather well validated in the general IS context, as discussed in section 2.5.1. Information quality was split into information contextual quality and information representational quality (corresponding to the quality of information content and information presentation, respectively). System quality was represented as a combination of perceived usefulness and perceived ease of use. The self-regulatory efficacy was hypothesised as a moderator of all relationships in the model involving learner satisfaction. Arguably, the study was an exploratory study, as justifications for the multiple moderator relationships in the model were not equally strong.

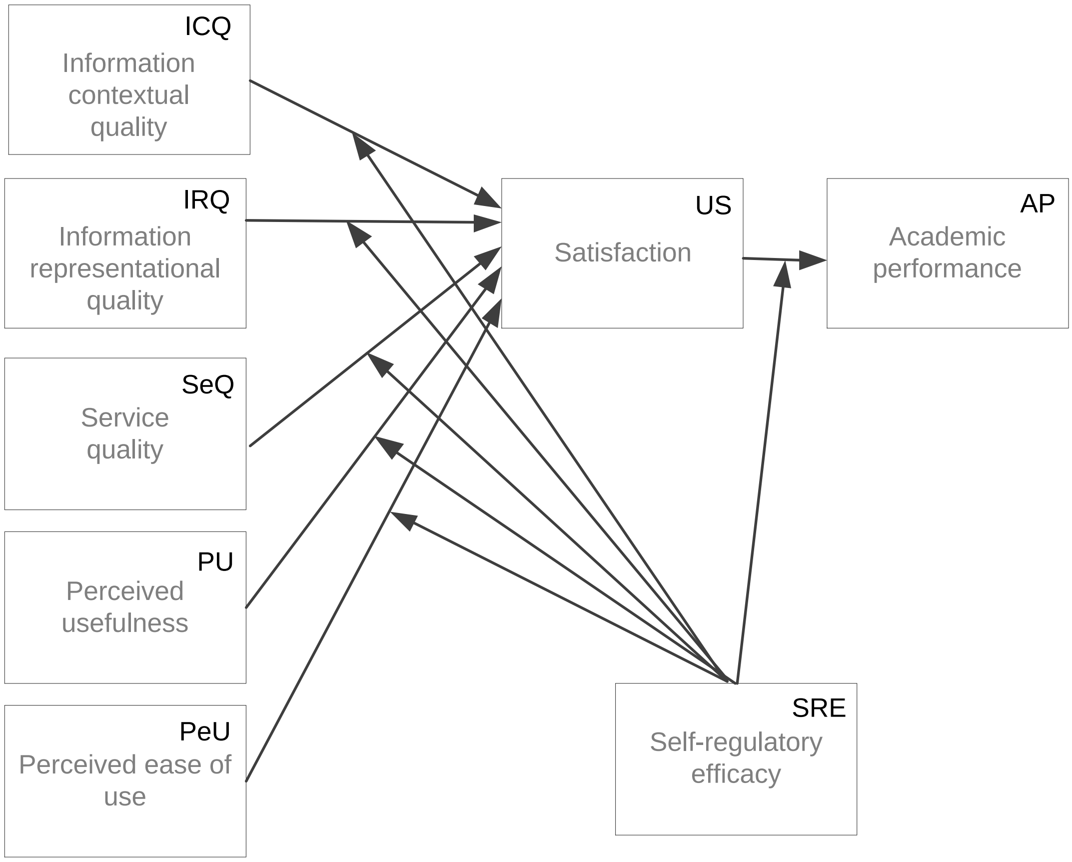


Figure 2.11 e-Learning systems success model by Lee and Lee (2008, p.36).

The measures were adapted from a number of literature sources (referenced in the article). The model was tested with students enrolled in online courses at a Korean university. Response rate is not given in the article, and the article just states that 289 usable responses were obtained.

The model was tested using the partial least square technique, simultaneously testing the measurement and the structural models. Convergent and discriminant validity were confirmed via composite reliability, Cronbach alpha, and square root of AVE. It is not clear from the article if any adjustments to the model were necessary based on measurement model analysis.

For the structural model, path coefficients and their statistical significance were reported. Information representational quality, system quality, and perceived usefulness affected satisfaction. In terms of the effect size, the effect on satisfaction of perceived usefulness ($\beta = .32$) was stronger than the effect of information representational quality ($\beta = .20$) and system quality ($\beta = .24$). Satisfaction had a relatively strong effect on academic performance ($\beta = .39$). The study found all of the hypothesised moderator effects for relationships involving satisfaction as a dependent variable to be statistically significant. According to the R squared value, the model predicted 15.3% of variance in academic performance (construct used to represent net benefits).

It should be noted that the academic performance in this study was operationalised with items reflecting learner expectations regarding obtaining a good grade in the e-Learning course. Therefore, the academic performance construct did not capture the level of learning in a broad sense (see section 2.4.4.3 for a discussion of different facets of learning). In addition, the items for the construct were formulated in an inconsistent way (some referring to the grade for the course as already known, and others referring to the grade as if it was not known yet), likely to cause confusion among the respondents. Nevertheless, this did not cause problems with convergent and discriminant validity, and there was a strong relationship between satisfaction and academic performance, confirming the nomological validity of the measure.

In the e-Learning success model by Chiu, Chiu, et al. (2007) introduced in section 2.5.3.2, the distributed fairness construct (which represented the extent to which student grades reflected their expectations) was found to affect learner satisfaction (with $\beta = .24$). On the other hand, in the model by Lee and Lee (2008), learner satisfaction affected academic performance (with $\beta = .39$). While the nature of the two relationships in the two models appears to be similar, the causality for the relationship flowed in opposite directions.

2.5.3.5 LMS use and teacher performance: The role of task-technology fit

McGill, Klobas, and Renzi (2008) formulated a model from the instructor perspective (based on the Godhue and Thompson's, 2003, technology-to-performance chain framework) to evaluate the influence of task-technology fit on LMS utilisation and performance. McGill and Klobas defined LMS as an "information system that supports e-Learning". In comparison, Olyfemi (2007) defined LMS as "application software that supports content management, knowledge sharing, information gathering and redistribution, as well as opportunities for collaborative activities", and Abdel-Wahab (2008) defined LMS as "an integrated set of networked computerised tools that support online learning". Thus, unlike in the studies by Olyfemi and Abdel-Wahab, the term LMS in the study by McGill and Klobas was defined similar to the term e-Learning system in the present study (see section 2.4.1).

Compared to the task technology fit model introduced by Godhue and Thompson (1995), the model by McGill and Klobas did not include task, technology, and individual characteristics as precursors of task technology fit. The precursors of utilisation based on theories of attitude and behaviour included in the model were social norms and facilitating conditions theory.

From the perspective of DeLone and McLean (2003), task technology fit can be seen as related to system quality and to information quality (as discussed in section 2.5.2). Facilitating conditions—interpreted as the extent to which users perceive that they are supported in the use of the system—can be seen as related to service quality in the DeLone and McLean model (see Figure 2.7).

Construct measures were adapted from a number of literature sources and reworded to fit the context of the study. The items were not included in the publication, and some of the constructs used in the model (such as facilitating conditions and performance impacts) were not clearly defined, making it somewhat difficult to interpret the results.

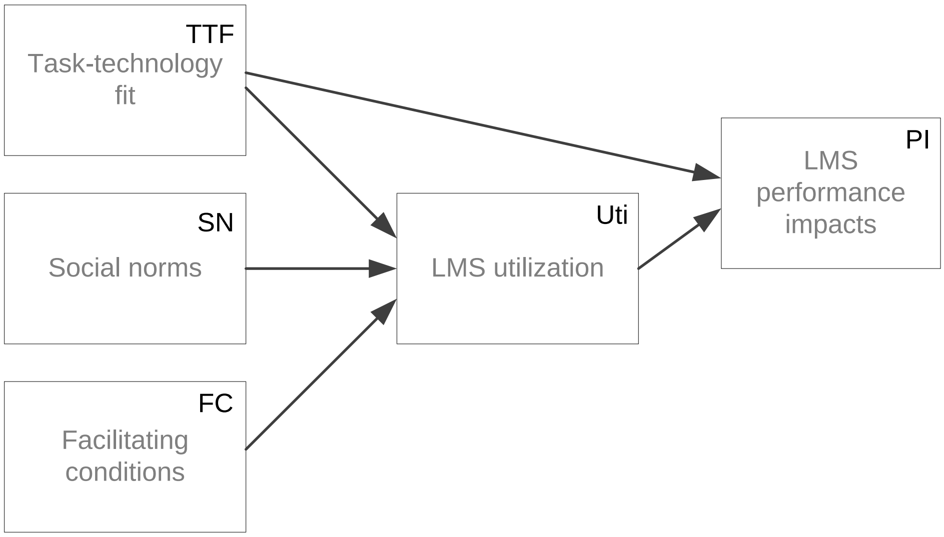


Figure 2.12 e-Learning systems success model by McGill, et al. (2008, p.650).

The model was tested with instructors at a single university in Australia. All participants had experience in using the LMS. Response rate is not given in the article; 67 usable responses were obtained.

The model was tested using partial least squares analysis, with the measurement model considered separately from the structural model. Several items were dropped based on the analysis of the measurement model; the resulting model had no convergent or discriminant validity issues.

For the structural model, path coefficients and their statistical significance were reported. The only effect in the model found to be statistically significant was the effect of task technology fit on LMS performance impacts. In terms of the effect size, task-technology fit had a strong effect on LMS performance impacts ($\beta = .52$). According to the R-square value, the model predicted 32% of variance in LMS performance impacts.

2.5.3.6 An overview of models of e-Learning systems success based on the IS success model and on task technology fit model—studies that appeared before January 1 2009

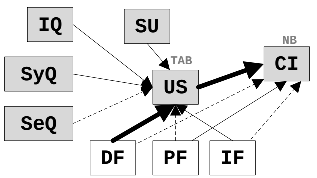
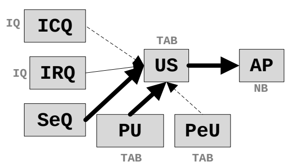
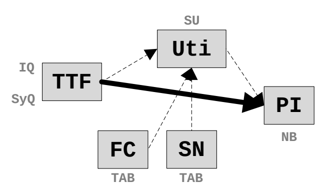
This section presents the overview of e-Learning systems success studies based on DeLone and McLean's (2003) IS success model or task technology fit model that appeared before January 1 2009 (and thus influenced the structure of the research models of the present study—see the discussion at section 2.2). The studies are summarised in Tables 2.2, 2.3, and 2.4.

Most of the studies involving model validation were conducted in Taiwan or Korea—in specific cultural contexts distinct from New Zealand; all of these studies validated models from learner perspective and were based on DeLone and McLean IS success model. The only study not from Taiwan or Korea was the study by McGill et al. (2008); in addition, it was the only study from the instructor perspective and the only study based on the task technology fit model.

Of the two studies conducted from the learner perspective that involved structural model testing, the model in the study by Lee and Lee (2008) fit the data better in terms of more of the hypothesised effects confirmed and having relatively strong effects. For both of the studies, there were problems in how construct content was defined—see the criticism in sections 2.5.3.2 and 2.5.3.4. In terms of the model structure, the following aspects constituted research gaps. None of the two studies distinguished institutional support to learners (generic support with using the system) from e-Learning support provided by the instructor, none of the two studies considered system quality and service quality in the same model (as discussed in section 2.5.3.2, service quality in the model by Chiu, Chiu, et al. (2007) had content that described additional aspects of system quality, rather than service quality). Moreover, the only model that considered student learning—the one by Lee and Lee (2008)—focused on academic performance in terms of grades, rather than on the level of leaning achieved. A further (relatively minor) research gap was that the models were tested in cultural context very different from New Zealand: one may expect that in cultures with high power distance, such as Taiwan and Korea, learners would use the e-Learning system differently from the relatively low power distance New Zealand, as learners may be unlikely to challenge instructors, and instructors may be less likely to interact with learners via the system in an equitable manner, and are more likely to emphasise using the system for broadcasting messages rather than reacting to student questions and concerns.

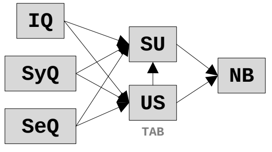
The only study from instructor perspective was the study by McGill et al. (2008). Even though the study is highly relevant to the topic of this thesis, some of the aspects of how the results were reported made it difficult to interpret the results. In particular, the study did not explicitly define the meaning of the constructs included in the model and did not report the items used to measure the constructs. The model constructs were adapted from studies conducted in contexts other than e-Learning; therefore, the exact meaning attributed to the constructs in context of e-Learning is not entirely clear. Moreover, the study did not report the response rate, making it somewhat difficult to assess the possibility of bias due to self-selection. Finally, the study was conducted at a single university; therefore, the generalisability of the results was limited. Only one of the five effects hypothesised in the study was confirmed; therefore, the overall fit of the model assessed in terms of the statistical significance of hypothesised effects (as it is a common practice for PLS models) was, arguably, not strong. The analysis above suggests a research gap: there is a need to formulate and to test an e-Learning systems success model from the instructor perspective that would be internally valid in terms of demonstrating a good fit to the data, and it is desirable to test the model based on data collected from multiple organisations (thus demonstrating that the model has not only internal, but also external validity, in terms of being generalisable to multiple organisations).

Table 2.2 e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model—before January 1 2009

	Study	Section	Cultural context	Participants	Perspective	Model construction and testing[a]	
1	Holsapple and LeePost (2006)	2.5.3.1	United States	University students	Student	Model identical to DeLone and McLean (2003) IS success model.	Not tested. Constructs used to describe stages of an e-Learning system implementation project.
2	Chiu, Chiu, et al. (2007)	2.5.3.2	Taiwan	University students	Student	Based on DeLone and McLean IS success model. Added distributive fairness (DF), procedural fairness (PF), and interactional fairness (IF). Used continuance intention (CI) to represent net benefits.	
3	Wang et al. (2007)	2.5.3.3	Taiwan	Learners – organisation employees	Student	Model identical to DeLone and McLean IS success model.	Tested the measurement model only.
4	Lee and Lee (2008)	2.5.3.4	Korea	University students	Student	Based on DeLone and McLean IS success model. Interpreted information quality as information contextual quality (ICQ) and information representational quality (IRQ). Academic performance (AP) represented net benefits.	
5	McGill et al. (2008)	2.5.3.5	Australia	University instructors	Instructor	Task-technology fit model with factors based on theories of attitude and behaviour represented by facilitating conditions (FC) and social norm (SN).	

[a]Constructs related to constructs in the DeLone and McLean (2003) model are given as grey rectangles. The spatial arrangement for such constructs is held as close as possible to the geometrical arrangement used by DeLone and McLean. Constructs related to constructs by DeLone and McLean, but named differently, are labelled to make the correspondence explicit (with one exception – factors that can be seen as precursors of usage suggested by theories of attitude and behaviour, as suggested by task technology fit theory, are labelled by TAB, including the user satisfaction construct from DeLone and McLean model). Abbreviated construct names used in the diagrams are expanded in Table 2.5. Thick solid lines indicate strong and medium effects; thin solid lines indicate weak effects.

DeLone and McLean (2003) model (see Figure 2.7)



Task technology fit model (see Figure 2.8)

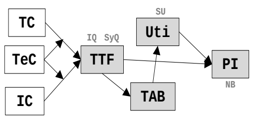


Table 2.3 Constructs included in e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model.

Construct		Covered in[a]
AP	Academic performance	4
Att	Attitude	6
CI	Continuance intention	2
DF	Distributive fairness	2
EC	Expected consequences	6
FC	Facilitating conditions	5, 6
GR	Grade	6
ICQ	Information contextual quality	4
IF	Interactional fairness	2
II	Instructor involvement	8
IN	Instructor norm	6
IQ	Information quality	2, 7, 8
IRQ	Information representational quality	4
PeU	Perceived ease of use	4
PF	Procedural fairness	2
PI	Perceived impact	5
PL	Perceived learning	6
PU	Perceived usefulness	4
SB	Student benefits	8
SeQ	Service quality	2, 4, 8
SI	Student involvement	8
SN	Social norm	5, 6
SRE	Self-regulated efficacy	4
SS	Student success	7
SU	System use	2, 7, 8
SyQ	System quality	2, 7, 8
TTF	Task technology fit	5, 6
US	User satisfaction	2, 4, 7, 8
Uti	Utilisation	5, 6

[a]Numbers listed in this column correspond to studies in the first column of Table 2.2 and Table 2.5.

Table 2.4 e-Learning systems success models based on the DeLone and McLean's IS success model and on task technology fit model that appeared before January 1 2009—hypotheses tested and effects discovered

		Effect found[a]			
	Hypothesis	**None**	**Weak**	**Strong**	**Related to**
	Effects of system quality and related constructs				
TTF -> UTI	Better task technology fit results in more system utilisation	5			SyQ -> SU
SyQ -> US	Better system quality results in higher user satisfaction		2		SyQ -> US
	Effects of information quality and related constructs				
IQ -> US	Higher information quality results in higher user satisfaction		2		IQ -> US
ICQ -> US	Higher information contextual quality results in higher user satisfaction	5			IQ -> US
IRQ -> US	Higher information representational quality results in higher user satisfaction		5		IQ -> US
	Effects of service quality and related constructs				
FC -> UTI	Better facilitating conditions results in more system utilisation	5			SeQ -> SU
SeQ -> US	Better service quality results in higher user satisfaction	2		4	SeQ -> US
	Effects of system use and related constructs				
SU -> US	Higher the system use the higher the user satisfaction		2		SU -> US
UTI -> PI	Higher system utilisation results in higher instructor performance	5			SU -> NB
	Effects of factors suggested by models of attitude and behaviour (including user satisfaction)				
US -> CI	Higher user satisfaction results in e-Learning continuance			2	US -> NB
US-> AP	Higher user satisfaction results in better academic performance			4	US -> NB
PU ->US	Perceived usefulness results in higher user satisfaction			4	
PeU ->US	Perceived ease of use results in higher user satisfaction	4			
SN ->UTI	Social norms results in more system utilisation	5			TAB -> UTI
	Other effects				
DF ->US	Higher distributive fairness results in higher user satisfaction			2	
PF ->US	Higher procedural fairness results in higher user satisfaction	2			
IF ->US	Higher interactional fairness results in higher user satisfaction		2		
DF ->CI	Higher distributive fairness results in e-Learning continuance	2			
PF ->CI	Higher procedural fairness results in e-Learning continuance		2		
IF ->CI	Higher interactional fairness results in e-Learning continuance	2			

[a]Numbers listed in these three columns correspond to studies in the first column of Table 2.2 and Table 2.5.

Table 2.3 presents the constructs included in the e-Learning systems success models based on DeLone and McLean IS success model and task technology fit model. The studies were not consistent in interpreting the net benefits construct. Lee and Lee (2008) interpreted net benefits construct as academic performance—they measured the construct by looking at the perceptions of students about their grades. In contrast, Chiu, Chiu, et al. (2007) interpreted net benefits as learner intention to continue e-Learning (a desirable outcome, but clearly different from learning the target subject matter). McGill et al. (2008) used task technology fit model as the basis for their model and, as suggested by task technology fit model (Godhue & Thompson, 1995), appeared to interpret net benefits in terms of instructor perceptions about the impact of the system on their effectiveness of teaching and efficiency.

Chiu, Chiu, et al. (2007) in their study from the learner perspective used the constructs of information quality and system quality, as suggested by DeLone and McLean's IS success model (2003). Lee and Lee (2008) replaced information quality with information contextual quality (focusing on content) and information representation quality (focusing on clarity and structure); they replaced system quality by perceived usefulness and perceived ease of use (constructs focusing more explicitly on learner perceptions). McGill et al. (2008) in their study from the instructor perspective (based on task technology fit model) used task technology fit construct, which can be seen as representing both system quality and information quality (with the content focusing on how the features and the content provided by the system fit the likely requirements of the instructors).

Chiu, Chiu, et al. (2007) and Lee and Lee (2008) included the service quality construct. Chiu et al. defined service quality similar to system quality (as discussed in 2.5.3.2). The facilitating conditions construct in the study by McGill et al. (2008) was described as "organisational support for system use", and thus appeared to be close in content to the service quality construct suggested by the DeLone and McLean (2003) model.

Chiu, Chiu, et al. (2007) included the construct of system use, and McGill et al. (2008) included the highly related construct of utilisation. Lee and Lee did not include system use or any similar construct, and they did not give a justification for not including system use, even though their model was explicitly based on DeLone and McLean model.

User satisfaction was included in both of the studies directly based on DeLone and McLean IS success model (Chiu, Chiu, et al., 2007; Lee & Lee, 2008). In both of the studies, user satisfaction was hypothesised to affect the construct corresponding to net benefits in DeLone and McLean IS success model. McGill et al. (2008), as suggested by the task technology fit model, included factors based on theories of attitudes and behavior as precursors of utilisation; user satisfaction is one of the possible factors in this category, but it was not used by McGill et al.

As shown in Table 2.4, factors suggested by models of attitudes and behavior (particularly, user satisfaction) had strong effects on constructs used to represent net benefits across studies. However, the effects of system quality and information quality were not strong.

Even though the only study from teacher perspective, the study by McGill et al. (2008), used a model based the task technology fit model, and all of the studies from student perspective were based on the DeLone and McLean IS success model, no clear argument was provided why the task technology fit model is particularly suited to formulating a model from teacher perspective.

2.5.4 e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model—studies that appeared after January 1 2009

This section, in chronological order, discusses the existing multidimensional models of e-Learning systems success based on the DeLone and McLean's IS success model and on task technology fit model published after January 2009. The section is concluded by an overview of the models (see section 2.5.4.5 and Table 2.5).

2.5.4.1 A task-technology fit view of learning management system impact

McGill and Klobas (2009) formulated a model from the student perspective (based on the Godhue and Thompson's, 1995, technology-to-performance chain framework) to evaluate the influence of task-technology fit on LMS utilisation and perceived impact on learning (see Figure 2.13). The study followed the earlier study by the same authors (McGill et al., 2008), which evaluated a model from teacher perspective based on the task technology fit model (introduced in section 2.5.2). Nonetheless, the study did not discuss the relationship between the two models (and, in fact, did not reference the earlier study at all).

Compared to the task technology fit model as it was introduced by Godhue and Thompson (1995), the model by McGill and Klobas (2009) did not include task, technology, and individual characteristics as precursors of task technology fit. The precursors of utilisation based on theories of attitude and behaviour included in the model were expected consequences of LMS use, attitudes towards LMS use, social norms, and facilitating conditions. The measures were adapted from a number of literature sources to fit the context of the study.

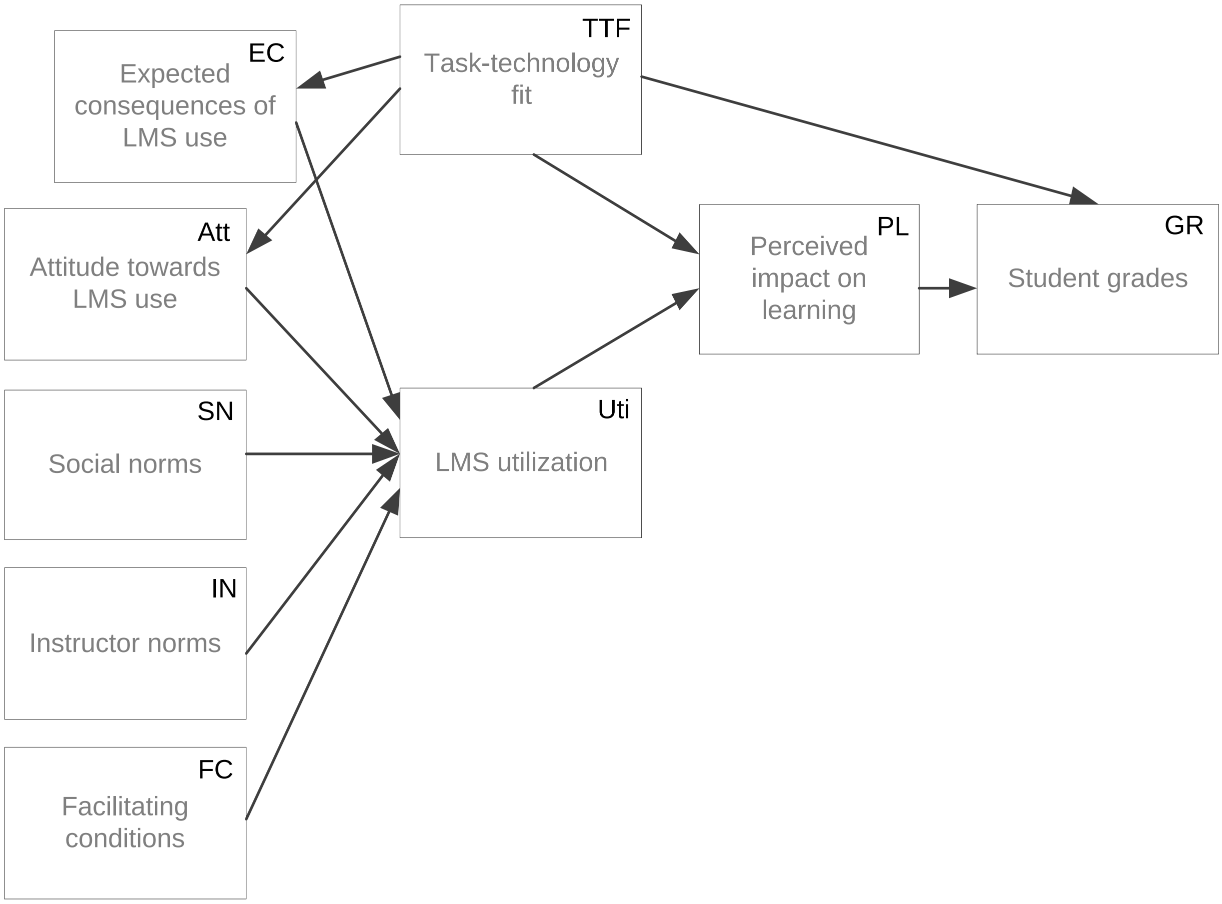


Figure 2.13 e-Learning systems success model by McGill and Klobas (2009, p.502).

The model was tested with students enrolled in 17 different undergraduate degrees at a single university in Australia. All of the participants had experience in using online learning. Response rate is not given in the article; 267 usable responses were obtained.

The model was tested using partial least squares analysis, with the measurement model considered separately from the structural model. No convergent or discriminant validity issues were discovered.

Task-technology fit affected perceived impact on learning and student grades. In terms of the effect size, the direct effect of task technology fit on perceived impact on learning ($\beta = .53$) was stronger than the direct effect on student grades ($\beta = .12$) (the total effect was not reported). LMS utilisation had a strong effect on perceived impact on learning ($\beta = .30$). Task-technology fit had a strong effect on expected consequences of LMS use ($\beta = .58$) and on attitude towards LMS use ($\beta = .78$). Attitude towards LMS use ($\beta = .25$) and instructor norms ($\beta = .29$) affected LMS utilisation. The effect of facilitating conditions on satisfaction was not confirmed. According to the R-square value, the model poorly predicted student grades (only 1.5% of variance); the model predicted 49% of variance in perceived impact on learning.

2.5.4.2 IS success model in e-Learning context based on student perceptions

Freeze, Alshare, Lane, and Wen (2010) tested an e-Learning success model from the learner perspective with constructs and hypothesised relationships identical to the IS success model (DeLone & McLean, 1992). They interpreted individual impact as system success (the extent to which the users perceive the system as performing well and promoting learning). The measures were adapted from a number of literature sources and adapted to fit the context of the study.

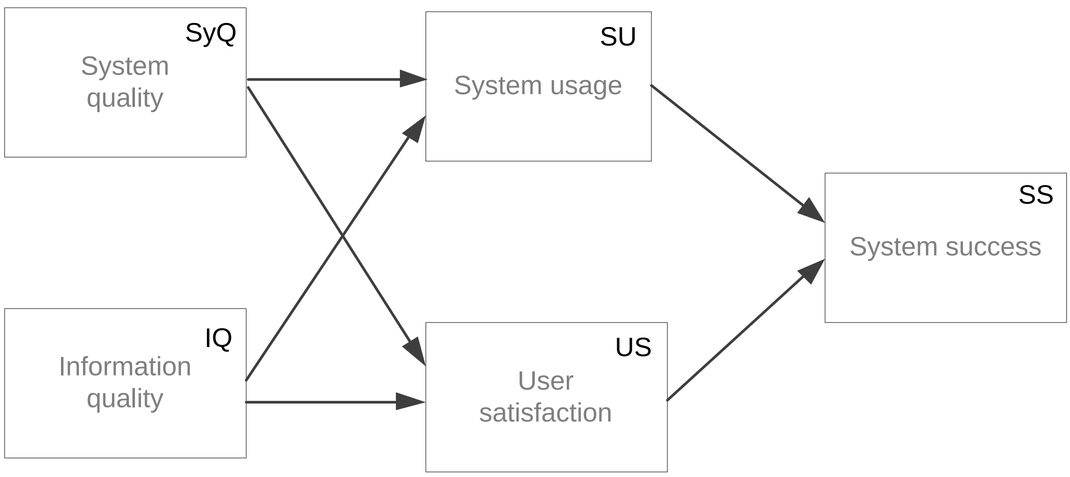


Figure 2.14 e-Learning systems success model by Freeze, et al. (2010, p.322).

The model was tested with students at a single university in the United States. All of the participants had experience of participating in at least one online course. With 2788 of potential participants contacted, 674 usable responses were obtained (thus, the response rate was 24.17%).

The model was tested using a co-variance based technique, with the measurement model tested separately from the structural model. After two items with poor loadings were removed, Cronbach alpha values and item loadings suggested convergent validity of the construct measures (discriminant validity was not considered). The overall model fit of the measurement model was adequate.

The overall fit of the structural model was also adequate. For the structural model, path coefficients and their statistical significance were reported. Information quality and system quality had strong effects on satisfaction ($\beta = .45$ and $\beta = .48$, respectively), and had medium effects on system usage ($\beta = .31$ and $\beta = .29$, respectively). Satisfaction had a strong effect on system success ($\beta = .94$) (indeed the effect was so strong that the discriminant validity between the two constructs is somewhat in doubt). The effect of system usage on system success was very weak.

2.5.4.3 The role of involvement in learning management system

Klobas and McGill (2010) extended the DeLone and McLean IS success model (2003) by incorporating student involvement and instructor involvement and tested the model from student perspective. The IS success model constructs and hypothesised relationships identical to the IS success model (DeLone & McLean, 2003). They interpreted net benefits as perceived student benefits, in terms of efficiency, productivity, and learning.

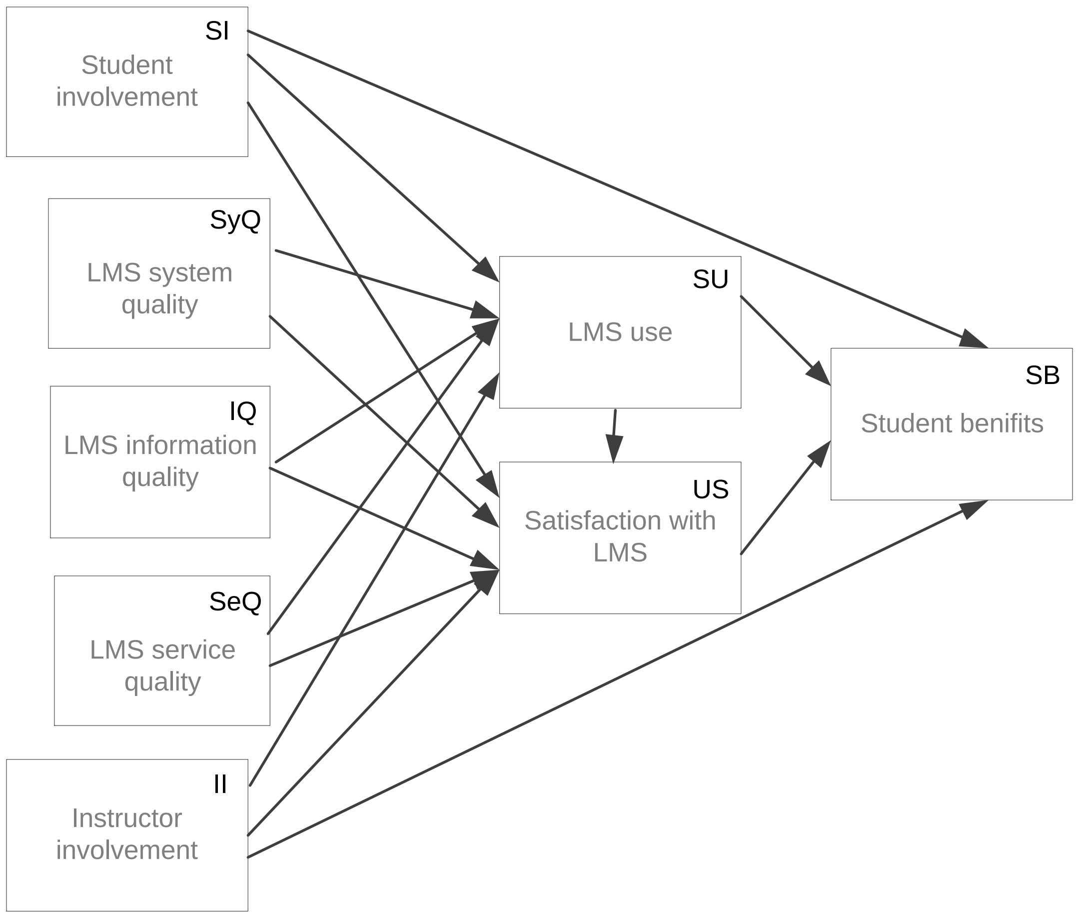


Figure 2.15 e-Learning systems success model by Klobas and McGill (2010, p.119).

The model was tested with students at a single university in Australia. All of the participants had experience in using online learning. With approximately 3000 of potential participants contacted, 244 usable responses were obtained (thus, the response rate was 8.13%). The model was tested using regression analysis.

The study developed a measure of use LMS based on self-reported time spent using three different e-Learning resources. For the rest of the constructs in the model, items were adapted from the literature to fit the context of the study. Principal component analysis was used to test the measurement model, which resulted in several items removed.

Regression analysis was used to test the structural model. The study tested two regression models. To focus on the effects of student involvement and instructor involvement, M1—a variation of the model in Figure 2.15 without the quality constructs (information quality, system quality, and service quality), was tested. Then, M2—the full model from Figure 2.15—was tested to investigate the roles of system, information, and service quality.

In the first model (M1), the effect of student involvement on perceived benefits was strong ($\beta = .51$); in comparison, the effect of student involvement on satisfaction was weak ($\beta = .16$). The effects of instructor involvement on satisfaction ($\beta = .16$) and on perceived benefits ($\beta = .20$) were weak.

In the second model (M2), the effect of student involvement on perceived benefits was strong, similar to the effect in M1 ($\beta = .45$); the effect of student involvement on satisfaction was not statistically significant. Also, in M2 the effects of instructor involvement on satisfaction and on perceived benefits were not confirmed. Overall, this outcome is not surprising—strong effects persisted across model variation, and marginal effects lost statistical significance when extra constructs were added. It is highly likely that if much larger sample were available, all effects that were discovered for M1 would remain statistically significant, but weak, in M2.

The results for the effects hypothesised in M2, but not in M1, were as follows. Student satisfaction was affected by information quality ($\beta = .32$) and service quality ($\beta = .31$) with medium effect size, and by system quality ($\beta = .15$) with a weak effect size. The rest of the effects hypothesised in M2, but not in M1, were not confirmed. According to the R-square value, the M2 model predicted 58% of variance in perceived student benefits.

2.5.4.4 A model from the instructor perspective: proposed but not validated

By examining the literature, Yengin et al. (2011) found that e-Learning systems success studies mainly focused on the learner side. There was a paucity of studies on faculty satisfaction and a lack of models representing e-Learning systems success from the instructor perspective, regardless of the online instructors playing an important role in an e-Learning context. To address this gap, they formulated an e-Learning systems success model from the instructor perspective based on the DeLone and McLean (2003) IS success model. They did not validate the model with real data, and did not solicit the opinion of experts or stakeholders regarding the validity of the constructs or relationships included in the model. They did suggest items that could be used to measure the constructs of the model. The procedure employed to formulate items was not explained in the article, and it appears the validity of the resulting measurement model was not tested in any way.

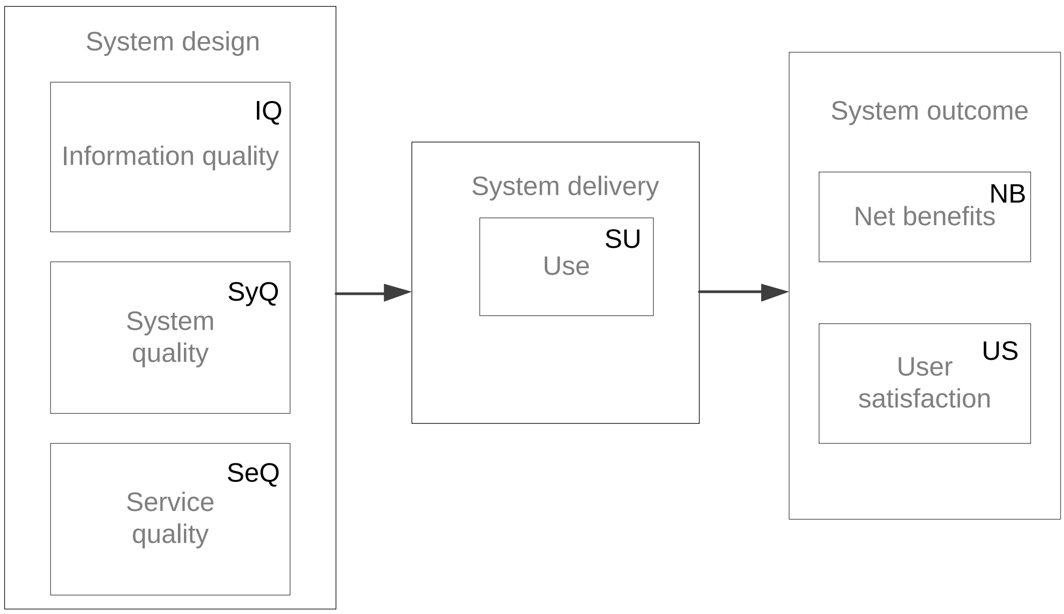


Figure 2.16 e-Learning systems success model by Yengin et al. (2011, p.1401).

2.5.4.5 An overview of models of e-Learning systems success based on the IS success model and on task technology fit model—studies that appeared after January 1 2009

This section presents a discussion of a number of e-Learning systems success studies based on DeLone and McLean's (2003) IS success model or task technology fit model that appeared after January 1 2009 (and thus did not influence the structure of the research models of the present study—see the discussion at section 2.2). The studies are summarised in Tables 2.3, 2.4, and 2.5.

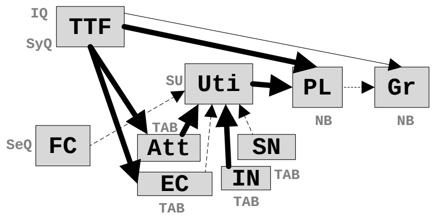
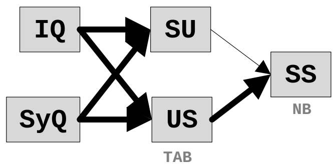
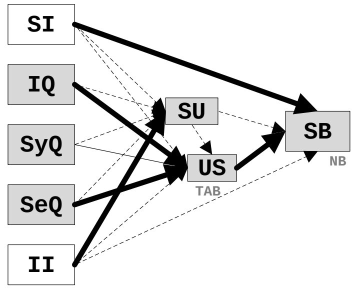
Of the studies involving model validation, two were conducted in Australia and one—in the US; all of these studies validated models from the learner perspective. One of the studies involving model validation was based on task technology fit model, and two others—on the DeLone and McLean IS success model.

These recent studies could not be taken into consideration when designing the present study. Nonetheless, it is of interest to analyse them from the perspective of the research gaps identified in section 2.5.3.6.

As to the research gaps identified for models from the student perspective in section 2.5.3.6: system quality and service quality were considered simultaneously in the study by Klobas and McGill (2010). Nonetheless, none of these studies considered service quality separately from e-Learning support from instructors, and none of these studies considered the level of student learning.

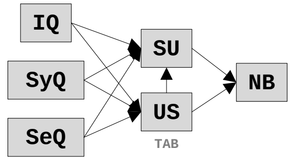
None of the models was from the instructor perspective; therefore, research gaps for models from instructor perspective were not addressed in the studies discussed in this section.

Table 2.5 e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model—after January 1 2009

	Study	Section	Cultural context	Participants	Perspective	Model construction and testing[a]	
6	McGill and Klobas (2009)	2.5.4.1	Australia	University students	Students	Task-technology fit model with perceived impact on learning (PL) and student grade (Gr) representing performance impact. Factors from theories of attitude and behaviour are attitude (Att), social norm (SN), instructor norm (IN), and expected consequences (EC).	
7	Freeze et al. (2010)	2.5.4.2	United States	University students	Student	DeLone and McLean (2003) IS success model with student success (SS) as net benefits.	
8	Klobas and McGill (2010)	2.5.4.3	Australia	University students	Students	DeLone and McLean (2003) IS success model extended by adding student involvement (SI) and instructor involvement (II). Used student benefits (SB) to represent net benefits.	
9	Yengin et al. (2011)[b]	2.5.4.4			Instructor	Divided net benefits construct into user satisfaction and other net benefits.	Model proposed, but not tested

[a]Constructs related to constructs in the DeLone and McLean (2003) model are given as grey rectangles. The spatial arrangement for such constructs is held as close as possible to the geometrical arrangement used by DeLone and McLean. Constructs related to constructs by DeLone and McLean, but named differently, are labelled to make the correspondence explicit (with one exception – factors that can be seen as precursors of usage suggested by theories of attitude and behaviour, as suggested by task technology fit theory, are labelled by TAB, including the user satisfaction construct from DeLone and McLean model). Abbreviated construct names used in the diagrams are expanded in Table 2.5. Thick solid lines indicate strong and medium effects; thin solid lines indicate weak effects.
[b]Yengin et al. did not validate their model. Hence, cultural context and participants are not applicable.

DeLone and McLean (2003) model (see Figure 2.7)



Task technology fit model (see Figure 2.8)

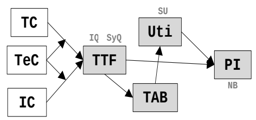


Table 2.6 e-Learning success models based on the DeLone and McLean's IS success model and on task technology fit model appeared after January 1 2009—hypotheses tested and effects discovered.

	Hypothesis	Effect found[a]			Related to
		None	Weak	Strong	
	Effects of system quality and related constructs				
SF -> CQ	Higher system flexibility results in better course content quality				
SyQ -> SU	Better system quality results in more system use	8		7	SyQ -> SU
SyQ -> US	Better system quality results in higher user satisfaction		8	7	SyQ -> US
TTF ->EC	Better task technology fit results in better expected consequences			6	
TTF ->ATT	Better task technology fit results in better attitudes towards LMS			6	
	Effects of information quality and related constructs				
CQ ->SF	Higher the level of course quality higher the system flexibility				
IQ -> SU	Higher information quality results in more system use	8		7	IQ -> SU
IQ -> US	Higher information quality results in higher user satisfaction			7, 8	IQ -> US
	Effects of service quality and related constructs				
SeQ -> SU	Better service quality results in more system use	8			SeQ -> SU
FC -> UTI	Better facilitating conditions results in more system utilisation	6			SeQ -> SU
SeQ -> US	Better service quality results in higher user satisfaction			8	SeQ -> US
	Effects of system use and related constructs				
SU -> US	Higher the system use the higher the user satisfaction	8			SU -> US
SU -> SS	Higher system use results in student success		7		SU -> NB
SU -> SB	Higher the system use more the student benefits	8			SU -> NB
UTI -> PL	Higher system utilisation results in higher impact on learning			6	SU -> NB
	Effects of factors suggested by models of attitude and behaviour (including user satisfaction)				
US -> SS	Higher user satisfaction results in student success			7	US -> NB
US -> SB	Higher the user satisfaction the more the student benefits			8	US -> NB
SN ->UTI	Social norms results in more system utilisation	6			TAB -> UTI
EC->UTI	Better expected consequences results in more system utilisation	6			TAB -> UTI
ATT->UTI	Positive attitudes results in more system utilisation			6	TAB -> UTI
IN>UTI	Instructor norms results in more system utilisation			6	TAB -> UTI
	Other effects				
SI ->SU	Higher student involvement results in more system use	8			
II ->SU	Higher instructor involvement results in more system use			8	
SI ->US	Higher student involvement results in higher user satisfaction	8			
II ->US	Higher instructor involvement results in higher user satisfaction	8			
PL ->GR	Positive impact of LMS on learning results in higher grades	6			

[a]Numbers listed in these three columns correspond to studies in the first column of Table 2.3 and Table 2.5.

Unlike the earlier studies discussed in section 2.5.3.6, the studies that appeared after January 1 2009 and involved model validation (see Table 2.6) were overall consistent in interpreting the net benefits construct. All the studies included student perceptions of learning as an important aspect. Moreover, McGill and Klobas (2009) also covered actual student grades (as reported by the students).

The studies varied in including or not including information quality, system quality, and service quality, with the justifications to include or not to include them not always clearly stated. Overall, the studies did not include any constructs that would be very different from the constructs covered by the earlier studies.

Although the studies before January 1 2009 did not find strong effects of information quality and system quality, the studies published after January 1 2009 found these constructs to have strong effects (see Table 2.6). Moreover, similar to the earlier studies, service quality was consistently found to have a strong effect on user satisfaction.

2.6 Research gaps

Lack of generalisable findings on quality of the e-Learning development and implementation process as an e-Learning systems success dimension. Previous studies identified quality of the e-Learning development and implementation as an important aspect of e-Learning systems success (Deepwell, 2007; Marshall & Mitchell, 2004; Howell et al., 2004). As explained by Deepwell and Marshall and Mitchell, the evaluation of an e-Learning product, such as a course or a program, in isolation is not meaningful. The process sustaining the product delivery needs to be examined to measure and to understand the quality of e-Learning initiatives. Despite the interest in the construct, the existing literature did not provide measurement items for the quality of the e-Learning development and implementation process construct. Also, previous studies did not provide generalisable findings on the relationship between quality of the e-Learning development and implementation process dimension and other e-Learning systems success dimensions.

Lack of e-Learning systems success models from the instructor perspective. While a number of studies formulated and tested multidimensional models of e-Learning systems success models based on the IS success model (DeLone & McLean, 2003), the existing studies involving multidimensional models of e-Learning systems success focusing on instructors as the stakeholders were limited. Instructors are major stakeholders, and the nature of their involvement is crucial in shaping learner experiences and in, ultimately, ensuring e-Learning systems success.

Lack of studies in the New Zealand context. Although there were a number of attempts to formulate and validate multidimensional models of e-Learning systems success based on the DeLone and McLean (2003) IS success model, there were no empirical studies involving multidimensional models of e-Learning systems success conducted in New Zealand.

2.7 Summary

The chapter presented the results of a literature review of e-Learning systems success research. A systematic review, which identified trends, as well as the most influential publications in this area, was used as a basis for a broader, unstructured review. The review covered the dimensions of e-Learning systems success identified in the literature and the existing multidimensional models of e-Learning systems success, based on the IS success model by DeLone and McLean (2003). The results of the review were presented as a multidimensional e-Learning systems success framework comprising organisational, instructor, and learner dimensions (see section 2.4.5). A number of research gaps relating to the problem addressed in this thesis were identified, namely, the lack of quantitative research on quality of the e-Learning development and implementation process dimension, lack of e-Learning systems success models formulated from the instructor perspective, and lack of e-Learning systems success studies in the New Zealand context (see section 2.6 for details).

CHAPTER 3: MODEL DEVELOPMENT: E-LEARNING SYSTEMS SUCCESS FROM THE INSTRUCTOR PERSPECTIVE

3.1 Introduction

This chapter is devoted to the discussion of the research model for the study from the instructor perspective. The e-Learning systems success dimensions tested in the study from the instructor perspective and the definitions of constructs are presented in Section 3.2. Section 3.3 discusses how the e-Learning systems success model for the study from the instructor perspective is developed based on the broad framework of e-Learning systems success formulated in the previous chapter. Then, the hypotheses generated for the study from the instructor perspective are discussed in detail.

3.2 e-Learning systems success dimensions tested in the study from the instructor perspective

According to the review of literature (in chapter two), there are a number of perspectives from which e-Learning systems success has been conceptualised. Based on the review of the literature, a multidimensional framework of e-Learning systems success was derived (see section 2.4.5). The framework can be used to develop e-Learning systems success models for specific situations and contexts, as discussed in section 2.4.5. This chapter describes the development, based on the e-Learning systems success framework, of an e-Learning systems success model from the instructor perspective. The constructs in the framework applicable to represent the instructor perspective (showed as shaded boxes in Figure 3.1) were included in the model.

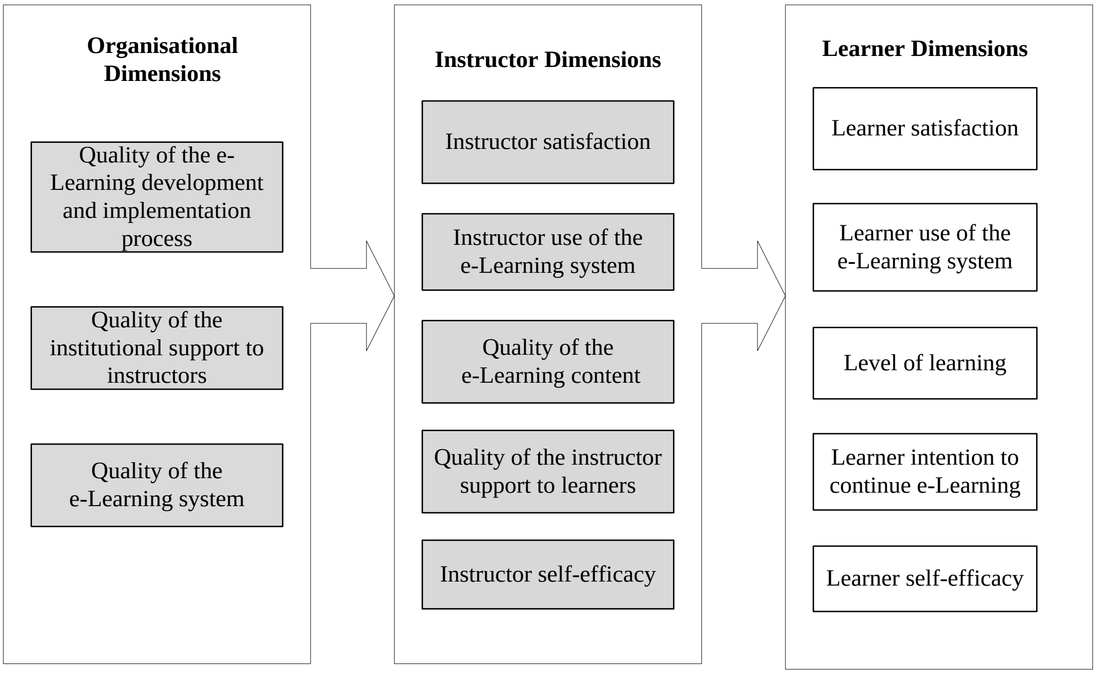


Figure 3.1 e-Learning systems success framework from figure 2.5 with constructs tested in the study from the instructor perspective shown as shaded boxes.

Constructs employed in the research model, together with their definitions, are presented in Table 3.1. The constructs are defined in the second column, and the literature supporting the inclusion of the constructs appears in the third column. A detailed discussion of the literature is given in the rest of this chapter, as hypotheses involving the constructs are discussed.

Table 3.1 Definitions of Constructs Used in the Study from the Instructor Perspective

Construct	Definition	References
Quality of the e-Learning development and implementation process	The way the organisation manages its e-Learning development and implementation process.	Phipps and Merisotis (2000); Samarawickrema and Stacey, 2007
Quality of the e-Learning system	Instructor belief about the performance characteristics of the e-Learning system.	Wang and Wang (2009); Wang et al. (2007)
Quality of the e-Learning content	Completeness, accuracy, timeliness, and ease of understanding of course materials provided via the e-Learning system.	Chiu, Chiu, et al. (2007); Wang and Wang (2009)
Quality of the instructor support to learners	Quality of overall support provided by the instructor to their learners via the e-Learning system.	Lee and Lee (2008); Selim (2007)
Quality of the institutional support to instructors	Overall support provided by the respective institutions to instructors in relation to teaching online.	Selim (2007); Wang and Wang, (2009)
Instructor use of the e-Learning system	The extent to which the e-Learning system is being used by the instructors.	DeLone and McLean (2003); Wang et al. (2007)
Instructor satisfaction	Perceived difference between prior expectation and the actual performance of the e-Learning system.	DeLone and McLean (2003); Chiu, Chiu, et al. (2007)
Instructor self-efficacy	Instructor's perceptions of their ability to accomplish a task.	Wang and Wang (2009); Artino and McCoach (2008); Compaq et al. (1999)

3.3 Research model for the study from the instructor perspective

The e-Learning systems success model from the instructor perspective was formulated based on the e-Learning systems success framework from section 2.4.5 of this thesis, on the IS success model by DeLone and McLean (2003) discussed in section 2.5, and on other literature relating to the role of an instructor in e-Learning. The relevant literature relating to the role of an instructor is detailed in the rest of this chapter, as the individual hypotheses comprised by the model, are justified.

The aim of this phase of the research is to address research question two of this research (see section 1.3) by exploring the dimensions of e-Learning systems success in the organisational context from the instructor perspective. Based on the literature, the constructs of the research model were connected to reflect the flow of causality (see Figure 3.2). In this research model, three organisational dimensions, namely, quality of the e-Learning development and implementation process, quality of the institutional support to instructors, and quality of the e-Learning system, were hypothesised to affect instructor use of the e-Learning system and instructor satisfaction. Quality of the e-Learning content and quality of the support provided to learners by the instructor can be seen as corresponding to individual impact in the DeLone and McLean (2003) IS success model (see section 2.5.1). The extent of instructor use of the e-Learning system and instructor satisfaction were hypothesised to predict the quality of the e-Learning content and the quality of support provided to learners by the instructor.

Furthermore, recent research on instructor acceptance of e-Learning consistently revealed instructor self-efficacy as an important individual motivational construct that affects instructor use of the e-Learning system and instructor satisfaction (Kao & Tsai, 2009; Smarkola, 2008; Wang & Wang, 2009). Therefore, instructor self-efficacy was integrated as a dimension affecting the extent of instructor use of the e-Learning system and the level of instructor satisfaction.

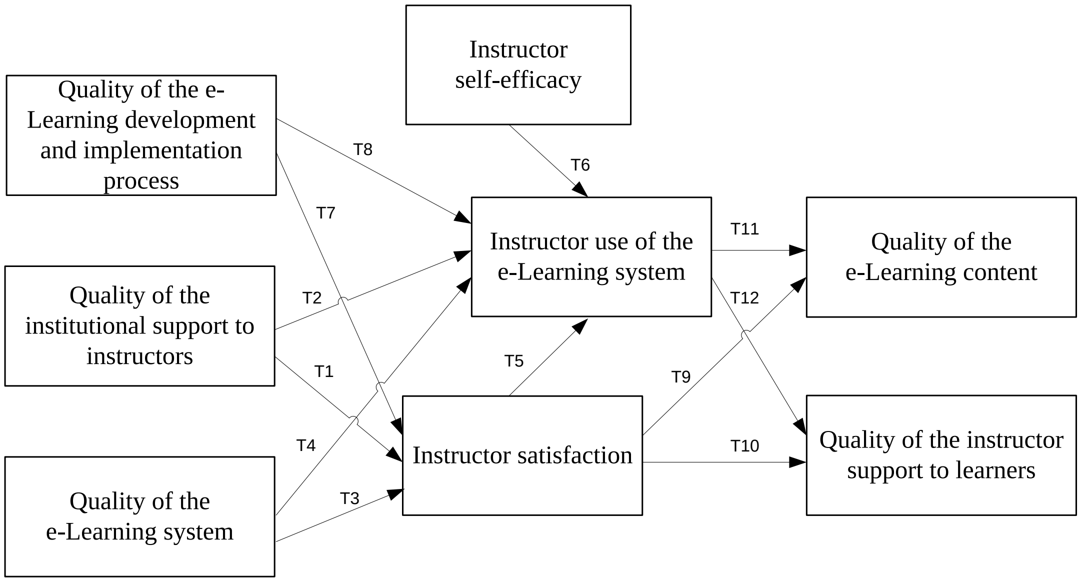


Figure 3.2 e-Learning systems success model for the study from the instructor perspective.

3.4 Hypotheses for the study from the instructor perspective

This section introduces and justifies the individual hypotheses in the research model in Figure 3.2. The hypotheses are discussed in the order of the overall flow of causality in the model, from organisational dimensions to instructor dimensions.

Hypotheses are numbered from T1 to T12 (the the label "T" justified by a mnemonic "Instructor is a Teacher"—label I was not used because of its similarity in appearance to the digit 1). Hypotheses T1 to T6 have counterparts (S1 to S6) in the model from the learner perspective introduced in chapter 4, with similar hypotheses having the same number; hypotheses T7 to T12 are specific to the model from the instructor perspective (see Appendix A).

3.4.1 The higher the quality of the e-Learning development and implementation process, the higher the level of instructor satisfaction and the greater the extent of instructor use of the e-Learning system

Despite most researchers having evaluated the success of e-Learning systems only on the outcomes of the process, recent research underscored the importance of quality of the e-Learning development and implementation process to assess the success of e-Learning initiatives. On the basis of this argument, researchers designed e-Learning benchmarks or quality criteria that could be used as guidelines to develop and implement successful e-Learning programmes (Deepwell 2007; Marshall & Mitchell, 2004; Phipps & Merisotis, 2000).

Howell et al. (2004) suggested seven strategies for integrating faculty concerns to ensure e-Learning programme success. They highlighted that providing more information about e-Learning programmes and related activities, faculty participation in the development process, information about e-Learning course and programme reviews, and user feedback information are critically important in ensuring e-Learning programme success. Effective, strong, and supportive policies in developing and implementing e-Learning motivate e-Learning system use by faculty members and improve their satisfaction (Samarawickrema & Stacy, 2007).

Thus, the quality of the e-Learning development and implementation process is expected to affect instructor intention to use the e-Learning system and the level of instructor satisfaction with e-Learning.

Based on the above justification, the following hypotheses are proposed:

T7: The higher the quality of the e-Learning development and implementation process, the higher the level of instructor satisfaction

T8: The higher the quality of the e-Learning development and implementation process, the greater the extent of instructor use of e-Learning system

3.4.2 The higher the quality of the institutional support to instructors, the higher the level of instructor satisfaction and the greater the extent of instructor use of the e-Learning system

Parasuraman, Zeithamal, and Berry (1985, p. 43) defined service quality as a global judgment or attitude relating to the superiority of a service. Previous research established the importance of the service quality construct in representing the success of different types of ISs. Landrum and Prybutok (2004) tested a model of library success and found that service quality affected perceived usefulness and user satisfaction. Lee, Lee, and Yoon (2000) reported results which are consistent with those of Landrum and Prybutok, thus providing further support for the service quality to satisfaction relationship. Moreover, the updated IS success model (DeLone & McLean, 2003) validated the service quality dimension as a measure of systems success.

A number of researchers suggested that institutional support to instructors affects e-Learning system use by instructors and instructor satisfaction. In a conceptual study, Howell et al. (2004) suggested that technical support and professional development to instructors accelerate instructor integration of technology in their courses. In a similar study, Crumpacker (2003) identified that motivation for faculty to participate in e-Learning increased with instructor training. A similar view was expressed by Lee (2001), who claimed that instructor motivation to use e-Learning and satisfaction with e-Learning change according to the quality of the instructional support they receive. Samarawikrema and Stacey (2007), based on a case study research conducted at a university in Australia, reported that instructor adoption of e-Learning is encouraged by supportive environments.

Based on the above justification, the following hypotheses are proposed:

T1: The higher the quality of the institutional support to instructors, the higher the level of instructor satisfaction

T2: The higher the quality of the institutional support to instructors, the greater the extent of instructor use of the e-Learning system

3.4.3 The higher the quality of the e-Learning system, the higher the level of instructor satisfaction and the greater the extent of instructor use of the e-Learning system

Quality of a system is concerned with the overall performance of hardware, software, network connections, and the user interface of the system (Rai, Lang, & Welker 2002; Seddon & Kiew, 1994) and was defined in simple terms as the degree to which a system is user friendly (Doll and Torkzadeh, 1988, p. 259). The well established TAM model (Davis, 1989) suggested that easy to use systems develop positive user attitudes towards using the system.

The two relationships—between system quality and usage behaviour, and between system quality and user satisfaction—are well supported by previous research (DeLone & McLean, 2003; Holsapple & LeePost, 2006). The well-established DeLone and McLean (2003) IS success model (see section 2.5.1) suggests that information quality and system quality affect system use and user satisfaction. A study by Rai et al. (2002) of the user of a computerised student information system demonstrated that system quality affects system usage and user satisfaction.

In the e-Learning context, similar relationships were established for learners (discussed in section 4.4.1). For instructors, Wang and Wang (2009) reported a weak indirect relationship between system quality and system use in a TAM based model (the level of statistical significance for the indirect relationship was not reported).

Based on the above justification, the following hypotheses are proposed:

T3: The higher the quality of the e-Learning system, the higher the level of instructor satisfaction

T4: The higher the quality of the e-Learning system, the greater the extent of instructor use of the e-Learning system

3.4.4 The greater the extent of instructor use of the e-Learning system, the higher the quality of the content and the quality of the instructor support to learners

System use refers to the nature and the appropriateness of system use and is not simply the time spent on system (DeLone & McLean, 2003). Many IS success researchers highlighted the importance of system usage as a measure of IS success (Davis, 1989, 1993; DeLone & McLean, 1992, 2003; Mahmood, Hall, & Swanberg, 2001). System use is one of the most commonly measured success constructs in IS research (Baroudi, Olson, & Ives, 1986; Davis, 1989). The nature of system use affects the individual or organisational performance (DeLone & McLean, 2003). If the users perceive that system use can improve their performance, they tend to use the functionalities of the system. DeLone and McLean (1992, 2003) suggested that system usage is a direct determinant of individual impact (such as task performance or quality of work). In a quantitative study of instructors from seven universities in the USA, Wang et al. (2010) demonstrated that quality of the system helps instructors enhance course quality.

Based on the above justification, the following hypotheses are proposed:

T11: The greater the extent of instructor use of the e-Learning system, the higher the quality of the content provided via e-Learning system

T12: The greater the extent of instructor use of the e-Learning system, the higher the quality of the instructor support to learners via e-Learning system

3.4.5 The higher the level of instructor satisfaction, the greater the extent of instructor use of the e-Learning system, the higher the quality of the content and the quality of the instructor support to learners

User satisfaction has been extensively used by IS success studies (DeLone & McLean, 2003; Seddon, 1997; Sun et al., 2008) in order to measure systems success. The well established DeLone and McLean (1992) IS success model (see section 2.4.1) suggests that system use and user satisfaction affect individual impact.

Bokhari (2005) conducted a meta-analysis of the studies that validated relationships between system usage and user satisfaction and concluded that there is a support for the relationship across a broad range of studies. According to Bokhari (2005), user satisfaction and system use have been the most widely used success measures of information systems. Bokhari (2005) and Muylle et al. (2004) demonstrated that it is very rare that both constructs are used at the same time to assess the systems success. Thong and Yap (1996) suggested that low satisfaction causes the users to discontinue using the system. Baroudi et al. (1986) demonstrated that user satisfaction leads to system usage. They argued that when a system fulfils the user’s needs, user system satisfaction increases which in turn leads to greater system use.

Within the e-Learning context, the quality of the course delivered by the instructor can be viewed as the individual impact in the sense of DeLone and McLean (2003) because the quality of the course is the measure of the instructor's performance. The quality of an e-Learning course consists of the quality of the content and the quality of the instruction and other support provided to the learners. Thus, it can be inferred that instructor satisfaction leads to the quality of the course provided via e-Learning.

Based on the above justification, the following hypotheses are proposed:

T5: The higher the level of instructor satisfaction, the greater the extent of instructor use of the e-Learning system

T9: The higher the level of instructor satisfaction, the higher the quality of the content provided via e-Learning system

T10: The higher the level of instructor satisfaction, the higher the quality of the instructor support to learners via e-Learning system

3.4.6 The higher the level of instructor self-efficacy, the greater the extent of instructor use of the e-Learning system

Self-efficacy (as discussed in section 2.3.2.5) refers to individuals' beliefs about their capabilities and their perception of being able to accomplish a task at a given level (Bandura, 1986). Self-efficacy affects the choice of activities, the effort, the persistence, and, ultimately, the achievement.

Previous research found that self-efficacy has a strong positive relationship with system usage (Park, 2009; Zhao, 2007). Compeau et al. (1999), based on a quantitative longitudinal study, reported that self-efficacy is a predictor of system use and affect with respect to the system. A number of quantitative studies confirm the relevance of self-efficacy as a predictor of teacher behaviour. Kagima and Hausafus (2000) explored the relationship between the computer self-efficacy of university faculty and the integration of electronic communication in their teaching. They found low integration levels of electronic communication in teaching by faculty members who reported low levels of confidence in using technology. Self-efficacy is an important predictor of determining adopters and non-adopters of computer technology amongst university faculty members (Faseyitan et al., 1996). Franklin (2007) and Thomas and Stratton (2006) found that instructors who are more confident in using information technology are more likely to use web based learning systems.

Based on the above justification, the following hypotheses are proposed:

T6: The higher the level of instructor self-efficacy, the greater the extent of instructor use of the e-Learning system

3.5 Summary

This chapter presented a multidimensional model of e-Learning systems success from the instructor perspective. The model was derived from the e-Learning systems success framework introduced in section 2.3.4. Dimensions of the framework included in the model were discussed one by one, along with the relevant relationships. Justifications for including the dimensions in the model from the instructor perspective were provided by referring both to the general IS literature and to e-Learning related literature. The following chapter (chapter four) presents the research model and the hypotheses from the learner perspective within this research.

CHAPTER 4: MODEL DEVELOPMENT: E-LEARNING SYSTEMS SUCCESS FROM THE LEARNER PERSPECTIVE

4.1 Introduction

This chapter is devoted to the discussion of the research model for the study from the learner perspective. The e-Learning systems success dimensions tested in the study from the learner perspective and the definitions of constructs are presented in section 4.2. Similar to the study from the instructor perspective (see chapter three), the model was derived from the e-Learning systems success framework formulated in chapter two (this aspect is discussed in section 4.3). Then, the hypotheses generated for the study from the learner perspective are discussed. Some of the hypotheses in the model from the learner perspective are similar to the hypotheses of the model from the instructor perspective introduced in chapter three.

4.2 e-Learning systems success dimensions tested in the study from the learner perspective

The research model for the study from the learner perspective was developed based on the e-Learning systems success framework formulated in chapter two (see section 2.4.5). The constructs in the framework applicable to represent learner perspective (showed as shaded boxes in Figure 4.1) were included in the model.

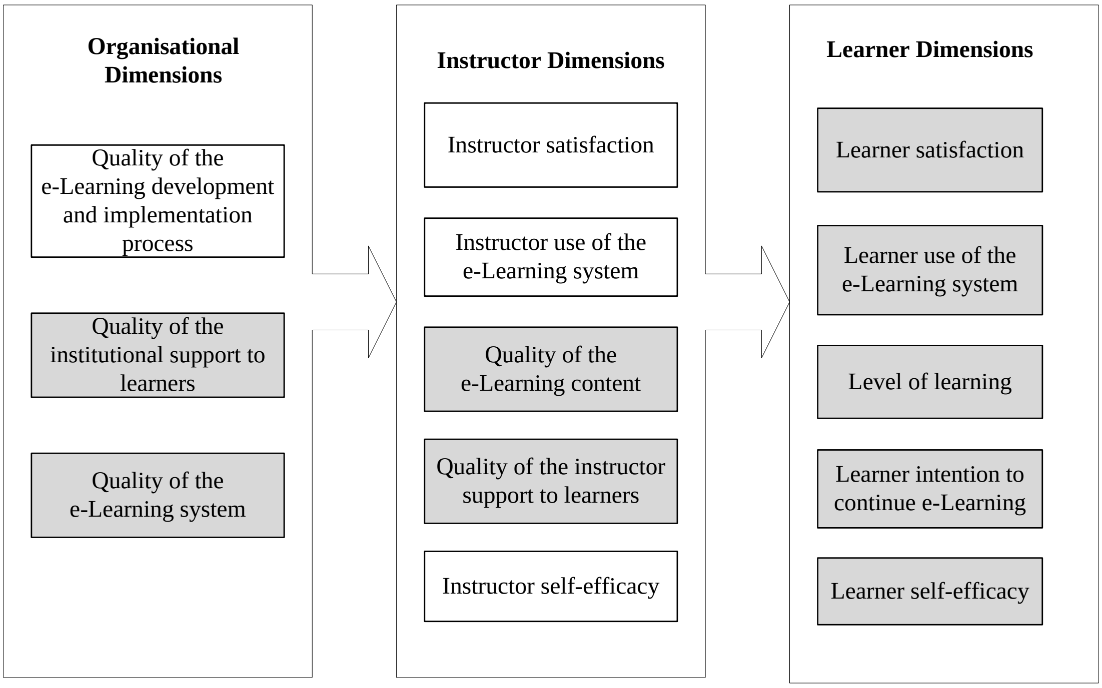


Figure 4.1 e-Learning systems success framework from figure 2.5 with constructs tested in the study from the learner perspective shown as shaded boxes.

Constructs employed in the research model, together with their definitions, are presented in Table 4.1, which is structured similarly to Table 3.1 summarising constructs used in the model from the instructor perspective. The constructs are defined in the second column, and the literature supporting the inclusion of the constructs appears in the third column. A detailed discussion of the literature is given in the rest of this chapter, as hypotheses involving the constructs are discussed.

Table 4.1 Definitions of Constructs Used in the Study from the Learner Perspective

Construct	Definition	References
Quality of the e-Learning content	Completeness, accuracy, timeliness, and ease of understanding of course materials provided via the e-Learning system.	Chiu, Chiu, et al. (2007); Lee and Lee (2008); Wang (2003)
Quality of the e-Learning system	Learner beliefs about the performance characteristics of the e-Learning system.	Wang et al. (2007)
Quality of the instructor support to learners	Learner perception of the quality of overall support provided by the instructor in relation to e-Learning.	Lee and Lee (2008); Masrom et al. (2008); Ngai et al. (2007); Selim (2007); Wang et al. (2007)
Quality of the institutional support to learners	Overall support provided by the respective institution to learners in relation to e-Learning.	Selim (2007)
Learner use of the e-Learning system	The extent to which the e-Learning system is being used by the learners.	DeLone and McLean (2003); Wang et al (2007)
Learner satisfaction	Perceived difference between prior expectations and the actual performance of the system.	Chiu, Chiu, et al. (2007)
Level of learning	The knowledge, skills, and abilities that learners have attained by engaging in e-Learning.	Rovai et al. (2009)
Learner intention to continue e-Learning	Learner intention to continue using e-Learning in the future.	Chiu, Chiu, et al. (2007)
Learner self-efficacy	Learner's perception of their ability to accomplish a task.	Artino and McCoach (2008); Compaq et al. (1999)

4.3 Research model for the study from the learner perspective

The relationships for the dimensions selected in section 4.2 were hypothesised based on the DeLone and McLean (2003) IS success model, discussed in section 2.5, and on other relevant prior research. The relevant literature relating to the role of a learner is detailed in the rest of this chapter, as the individual hypotheses comprised by the model are justified.

The aim of this phase of the research was to address research question two of this research (see section 1.3) by exploring the dimensions of e-Learning system success in an organisational context from the learner perspective. The study from the learner perspective complements the study from the instructor perspective, for which the research model was introduced in section 3.3.

While the model from the instructor perspective introduced in this thesis was the first attempt to test an e-Learning systems success model based on the DeLone and McLean (2003) generic model of IS success with instructors, there are a number of reports in the literature validating models of this type with learners. These reports were discussed in section 2.5.3 and 2.5.4.

The model of e-Learning systems success formulated in this thesis is presented in Figure 4.2. Viewing it as an adaptation and extension of the IS success model (DeLone & McLean, 2003; see section 2.5.1 of this thesis), it can be described as follows. Learner self-efficacy (learners' perceptions regarding their ability to use the system) was added as a dimension of e-Learning systems success. Service quality in the DeLone and McLean (2003) IS success model was interpreted as quality of the institutional support to learners and quality of the instructor support to learners. Individual impact was interpreted as level of learning and learner intention to use e-Learning in the future.

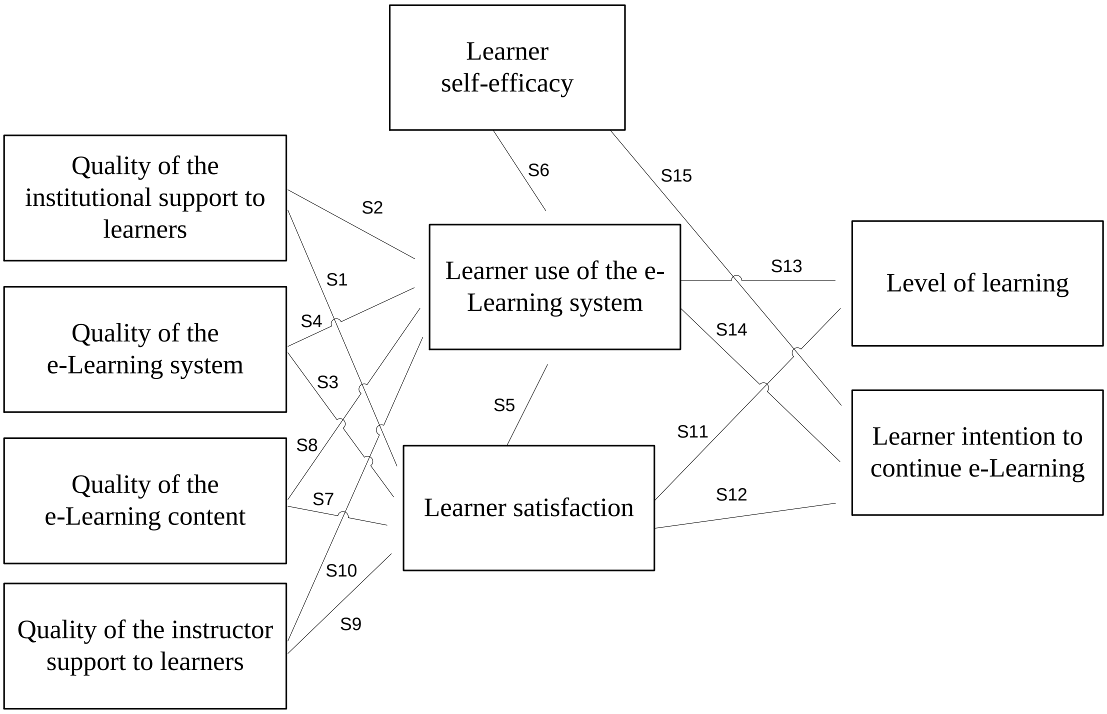


Figure 4.2 e-Learning systems success model for the study from the learner perspective.

4.4 Hypotheses for the study from the learner perspective

This section introduces and justifies the individual hypotheses in the research model in Figure 4.2. The hypotheses are discussed in the order of the overall flow of causality in the model, from organisational and instructor dimensions to learner dimensions.

Hypotheses numbers were assigned using the same approach as for the model from the instructor perspective (see session 3.4). Hypotheses are numbered from S1 to S15 (the label "S" justified by a mnemonic "Learner is a Student"—label L was not used because of its similarity in appearance to the digit 1). Hypotheses S1 to S6 have counterparts (T1 to T6) in the model from the instructor perspective introduced in chapter three, with similar hypotheses having the same number; hypotheses S7 to S15 are specific to the model from the learner perspective (see Appendix A).

4.4.1 The higher the quality of the institutional support to learners and the quality of the instructor support to learners, the higher the level of learner satisfaction and the higher the level of learner use of the e-Learning system

As explained in section 3.4.2, service quality can be defined as the difference between customer expectations of the service and their perceptions of the service performance (Parasuraman, Zeithamale, & Berry, 1994, p. 202). Better service quality results in higher levels of customer satisfaction (Brown & Chin, 2004; Oliver, 1980; Parasuraman et al., 1985; Zhu, Wymer, & Chen, 2002). The importance of the service quality construct in determining the success of different types of ISs is well established (Cenfetelli, Benbasat, & Al-Natour, 2008; Holsapple & LeePost, 2006; Lee & Lin, 2005; Park & Gretzel, 2007). Recognising the importance of service quality in ISs, DeLone and McLean (2003) updated the IS success model to include service quality as a determinant of system use and user satisfaction.

In an e-Learning environment, the instructor plays an important role (Holsapple & LeePost, 2006). The instructor role is similar to that of a service provider in any service organisation. Instructor service quality (such as giving timely feedback, providing content promptly, or helping with technical difficulties faced by learners) becomes more important than in traditional face-to-face classroom settings, as no physical interactions occur in online learning environments (Holsapple & LeePost, 2006). Chiu, Chiu, et al. (2007) suggested that instructor support for learners involved in e-Learning is an important predictor of e-Learning system use by the learners.

Previous e-Learning studies indicated that a timely response from instructors is important for learner satisfaction (Arbaugh, 2002; Chickring & Gamson, 1987; Eom et al., 2006; Sun et al., 2008). Conversely, non-timely instructor responses to learner queries negatively affect learner satisfaction (Soon, Sook, Jung, & Im, 2000). Lee and Lee (2008) emphasised the importance of learner support provided by both a dedicated IT support department and by instructors. Yet, at the same time, they suggested that because the learners come first to the instructor, whether it is for technical or learning content support, the quality of the instructor service to learners plays a more important role than that of the IT support department in a business organisation.

On the other hand, Govindasamy (2002), who suggested benchmarks for successful implementation of e-Learning, introduced institutional support as a quality benchmark for e-Learning systems success. Moreover, the Selim (2007) study suggested that institutional support is a critical success factors for learner acceptance and usage of e-Learning systems.

Based on this argument, the following hypotheses are proposed:

S1: The higher the quality of the institutional support to learners in relation to e-Learning, the higher the level of learner satisfaction

S2: The higher the quality of the institutional support to learners in relation to e-Learning, the higher the level of learner use of e-Learning system

S9: The higher the quality of the instructor support to learners in relation to e-Learning, the higher the level of learner satisfaction

S10: The higher the quality of the instructor support to learners in relation to e-Learning, the higher the level of learner use of e-Learning system

4.4.2 The higher the quality of the e-Learning system and the higher the quality of the e-Learning content, the higher the level of learner satisfaction

User satisfaction has been often considered in IS success research (DeLone & McLean, 1992, 2003; Seddon & Kiew, 1994; Seddon, 1997; Sun et al., 2008) and used in evaluating IS success and IS effectiveness (Baroudi et al., 1986; Chiva & Alegre, 2008; Zviran, Glezer, & Avni, 2006). Determinants of user satisfaction have been identified as information quality, system quality, and service quality (Kettinger & Lee, 1994, 1997, 1999; Pitt, Watson, & Kavan, 1995; Rai et al., 2002; Seddon & Kiew, 1994; Torkzadeh & Doll, 1999; Wixom & Watson, 2001). The DeLone and McLean (1992) model suggests that higher levels of information quality lead to higher levels of user satisfaction, and this relationship has been supported by quantitative empirical studies (McGill, Hobbs, & Kioba, 2003; Rai et al., 2002; Seddon & Kiew, 1994).

Research evidence from the e-Learning domain suggests that system quality affects e-Learning user satisfaction (Arbaugh, 2002; Chiu et al., 2005; Menchaca & Bekele 2008; Sun et al., 2008; Webster & Hackley, 1997). The higher the quality and reliability of the system, the higher the learner satisfaction would be (Piccoli et al., 2001; Webster & Hackley, 1997). Moreover, a number of e-Learning systems success studies suggested a positive relationship between information quality and learner satisfaction (Chiu, Chiu, et al., 2007; Holsapple & LeePost, 2006; Lee & Lee, 2008; Wang 2003; Yeung & Jordon, 2007).

Based on the justification given above, the following hypotheses are proposed:

S3: The higher the quality of the e-Learning system, the higher the level of learner satisfaction

S7: The higher the quality of the e-Learning content provided via e-Learning system, the higher the level of learner satisfaction

4.4.3 The higher the quality of the e-Learning system and the quality of the content, the higher the level of learner use of the e-Learning system

Perceived quality of a system refers to information quality, system quality, and service quality (Chiu et al., 2005; DeLone & McLean, 2003). The updated IS success model (DeLone & McLean, 2003) posited that these three quality related constructs have a direct effect on information systems use. The effects of information quality and system quality predicted by the IS success model were confirmed empirically (Holsapple & LeePost, 2006; Menchaca & Bekele, 2008).

The system quality of an e-Learning system from the learner perspective is the extent to which the system functions facilitate learning activities (Wang et al., 2007). The relationship between quality of the e-Learning content and system use and the relationship between system quality and system use were established in e-Learning systems success research focusing on learners (Holsapple & LeePost, 2006, LeePost, 2009).

Based on the above justification, the following hypotheses are proposed:

S4: The higher the quality of the e-Learning system, the higher the level of learner use of the e-Learning system

S8: The higher the quality of the content provided via e-Learning system, the higher the level of learner use of the e-Learning system

4.4.4 The higher the level of learner satisfaction, the higher the level of learner use of the e-Learning system, the higher the level of learning, and the higher the level of learner intention to continue e-Learning

User satisfaction is a primary factor influencing system usage behaviour (Karahanna et al., 1999). DeLone and McLean (1992) argued that use and user satisfaction are closely interrelated and that greater user satisfaction will lead to more use.

The relationship between user satisfaction and net benefits is well established in IS literature (DeLone & McLean, 2003; Jennex & Olfman, 2004). Further, in IS studies, it was demonstrated that higher performance is achieved by satisfied users rather than unsatisfied ones (Bailey & Pearson, 1983). Gatian (1994), in her study focusing on university information systems, showed that there is a strong relationship between user satisfaction and decision making performance and efficiency.

In e-Learning success research, one of the measures of the net benefits construct was student learning (Holsapple & LeePost, 2006; Wang et al., 2007). Student learning outcomes were defined in terms of knowledge, skills, and abilities learners attain as the result of their involvement in a particular set of educational experiences (Anderson, 2001). Bloom (1956) conceptualised learning as affective (development of a favourable or an unfavourable attitude toward learning), behavioural (development of psychomotor skills or observable behaviour change as a result of learning), and cognitive (comprehension and retention of knowledge).

Eom et al. (2008) established a positive relationship between student satisfaction of an e-Leaning system and student learning. Learning is arguably the most important benefit an individual student can obtain through an educational activity. This argument provides the basis for a learner satisfaction and level of learning relationship.

Based on the above justification, the following hypotheses are proposed:

S5: The higher the level of learner satisfaction, the higher the level of learner use of the e-Learning system

S11: The higher the level of learner satisfaction, the higher the level of learning

Consumer behaviour literature shows that satisfaction has a positive influence on customer repurchase intention (Oliver, 1980; Patterson, 1995). User satisfaction is vital in retaining and maintaining long-term relationships with customers (Wu et al., 2006). Recent research conceptualised continuance use of ISs as an important measure of systems success by explaining that the success of a system depends on continued usage rather than the initial use (Bhattacherjee, 2001; Roca & Gagne, 2008; Wu, et al., 2006; Yeung & Jordan, 2007). The expectation confirmation theory (Oliver, 1980) asserts that a user's continued usage intention is determined mainly by the satisfaction experienced during prior use of a product or service.

Recent research on e-Learning continued usage confirmed the results obtained in marketing and IS research (Chiu et al., 2005; Chiu, Chiu, et al., 2007; Lee, 2010; Roca et al., 2006; Tao et al., 2009; Yeung & Jordan, 2007). The studies of Chiu et al., Wu et al., and Chiu, Chiu, et al. with university students in Taiwan and Hong Kong confirmed a positive relationship between user satisfaction and continuance intention with regard to using e-Learning systems. This relationship was also confirmed in relation to employee perceptions of e-Learning continuance intention by Roca et al. and Yeung and Jordan, in the context of business organisations.

Based on the above justification, the following hypothesis is proposed:

S12: The higher the level of learner satisfaction, the higher the level of learner intention to continue e-Learning

4.4.5 The higher the level of learner use of the e-Learning system, the higher the level of learning and the higher the level of learner intention to continue e-Learning

Several researchers who validated DeLone and McLean's (2003) IS success model in e-Learning systems success research included items relating to student learning to operationalise the net benefits construct (Holsapple & LeePost, 2006; Wang, et al., 2007). However, none of these studies have taken student learning into consideration as a separate success dimension, even though learning is the most important outcome of any educational activity, regardless of the method of delivery (face-to-face or on-line). This study assumes that the use of the e-Learning system will contribute to level of learning.

Based on the above justification, the following hypothesis is proposed:

S13: The higher the level of learner use of e-Learning system, the higher the level of learning

Bhattacherjee (2001) developed and empirically validated a model based on the argument that the ultimate success of a new technology depends on the continued usage of the system. Similarly, results demonstrated by researchers in the e-Learning domain were consistent with IS literature and highlighted that users who were satisfied with the initial use of an e-Learning system tend to continue using e-Learning in the future (Wu et al., 2006).

Based on the above justification, the following hypothesis is proposed:

S14: The higher the level of learner use of the e-Learning system, the higher the level of learner intention to continue e-Learning

4.4.6 The higher the level of learner self-efficacy, the higher the level of learner use of the e-Learning system, and the higher the level of learner intention to continue e-Learning

Research has shown that self-efficacy beliefs positively influence many academic outcomes (Robbins, Lauyer, Davis, & Langley, 2004; Wood & Bandura, 1989). Higher self-efficacy can lead learners to set more demanding goals for themselves (Zimmerman, 1990). Kinzie (1990) showed that motivation to learn is higher for learners with a strong sense of self-efficacy. Learners with higher levels of self-efficacy engage in more challenging tasks, invest more effort and persistence, and demonstrate superior academic performance compared with learners who lack such beliefs (Zimmerman et al., 1992; Pajares & Millers, 1994). A number of studies examined the effect of self-efficacy in using online courseware on future intentions to use e-Learning. For instance, Artino (2009) and Liang and Wu (2010) found that self-efficacy in using an e-Learning system is positively related to learner satisfaction, perceived learning, and intention to enrol in future online courses.

A number of previous quantitative studies found that self-efficacy has a strong positive relationship with system usage. Yi and Hwang (2003) explore the relationship between the computer self-efficacy of learners in an introductory IS course at a large US university. They found computer self-efficacy as an important predictor of web-based information systems use. Park (2009) found that e-Learning self-efficacy as a strong predictor of behavioural intention to use e-Learning. The model developed by Park was tested with undergraduate students who had an experience of participating in at least one web based course at a university in Korea. Luarn and Lin (2005) tested a model of intention to use mobile banking and found that perceived self-efficacy affected behavioural intention to use the system.

Based on the above justification, the following hypotheses are proposed:

S7: The higher the level of learner self-efficacy, the higher the level of learner use of the e-Learning system

S15: The higher the level of learner self-efficacy, the higher the level of learner intention to continue e-Learning

4.5 Summary

This chapter presented a multidimensional model of e-Learning systems success from the learner perspective. The model was derived from the e-Learning systems success framework introduced in section 2.4.5. Dimensions of the framework included in the model were discussed one by one, along with the relevant relationships. Justifications for including the dimensions in the model from the learner perspective were provided by referring both to general IS literature and to e-Learning related literature. The next chapter (chapter five) presents a detailed discussion of the research methodology adopted in this research to address the research questions.

CHAPTER 5: RESEARCH METHODOLOGY

5.1 Introduction

The chapter begins with a discussion of the overall approach to research. Next, the organisational context, as well as the participants for the two studies—the study from the instructor perspective and the study from the learner perspective—are described. Then, instruments and instrument developing procedures are introduced, including the content validity survey and pilot studies. Next, the procedures used for data collection, screening, and analysis are discussed. The chapter concludes by describing ethical safeguards adopted in this research.

5.2 Overall approach to research

In this section, by considering the alternatives available, I discuss how the chosen research paradigm is implemented in this research to address the research questions stated in section 1.3.

5.2.1 Research paradigm

Research paradigm refers to assumptions about the nature of the knowledge upon which research is to be conducted (Hussey & Hussey, 1997). There are two main research paradigms in IS research: positivism and interpretivism (Chen & Hirschheim, 2004). The positivist paradigm starts with formulating hypotheses that can be tested with quantitative methods and these quantitative methods provide objective interpretations of reality (Orlikowski & Baroudi, 1991). A study is positivist if it provides (1) stating of formal hypotheses, (2) quantifiable measures of variables (3) hypotheses testing (4) drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski & Baroudi, 1991, p. 5).

On the other hand, the interpretivist paradigm depicts the subjective understanding of social reality by researchers and research participants, as they interpret the social reality in the context of particular situations. While positivist research makes assertions about a population that are supposed to be independent of anyone's subjective understanding, the interpretivist inquiries make no claims regarding the generalisability of results to particular populations. Rather, the readers of the research are expected to judge if the interpretations made from a particular point of view and in a particular context are valid in the contexts of interest to the readers (Orlikowski & Baroudi, 1991). Goles and Hirschheim (2000) and Orlikowski and Baroudi (1991), by reviewing IS literature, demonstrated that positivist research dominates the IS research context.

The aim of the present research was to make generalisable assertions for certain relationships. Therefore, the present research was dominated by the positivist paradigm, with elements of interpretivist research employed to interpret mechanisms behind the hypotheses confirmed.

5.2.2 Quantitative versus qualitative

A researcher needs to choose among quantitative, qualitative, or mixed method approaches. Quantitative research relies on objective measurements while qualitative research relies on direct interpretations of rich data by the researcher. Quantitative approaches generally deal with numbers where statistical methods are used in analysing data. Quantitative research allows the researcher to use inferential statistics to accept or to reject certain predetermined hypotheses. Therefore, the positivist research paradigm normally is implemented by using quantitative research.

Qualitative research is defined as any kind of research that produces findings not arrived at by means of statistical procedures (Strauss & Corbin, 1990, p.17). Qualitative approaches usually involve collection of data in an unstructured way, such as by in-depth interview or by observations. Rich data thus collected is particularly suitable for subjective interpretations. Therefore, the interpretivist research paradigm normally is implemented by using qualitative research.

Mixed methods research relies on a combination of quantitative and qualitative research (Cresswell, 2009). For example, qualitative methods may be used to interpret quantitative findings (Kaplan & Maxwell, 2005).

Research question two of this research (From the instructor and from the learner perspective, what are the dimensions of e-Learning system success in an organisational context, and how do they relate to each other?—see section 1.3) suggests hypotheses testing regarding whether constructs identified (in prior literature or from general knowledge of the domain) as possibly determining e-Learning systems success are significant. This suggests the use of quantitative methods and the positivist research paradigm.

Contributions for practice from this research proposed in section 1.5.2 suggest that an understanding of what determines e-Learning systems success achieved in this research is going to be of use to managers making decisions. Managers are more likely to accept the conclusions of this research if they are seen as objective and unbiased. This, again, suggests that generalisable, objective quantitative research relying on the positivist paradigm is more appropriate than interpretivist qualitative research.

In the study from the instructor perspective (see section 6.3), along with quantitative research focused on hypotheses testing, elements of qualitative, interpretivist research were used to better interpret the meaning of quantitative findings. This was achieved by analysing qualitative data obtained via open-ended questions added to the questionnaire. This allowed further insight into the quantitative findings (Leech & Onwuegbuzie, 2009), and thus addressed research question two in more depth. This approach corresponded to $QUAN$ $(+qual)$ embedded mixed research design according to the classification of mixed research designs by Creswell (2009, p. 71).

5.2.3 Exploratory versus explanatory

Social research may be conducted as either exploratory or explanatory studies (Sekaran, 2006). Exploratory research is carried out to develop an initial understanding when little is known about a certain phenomenon—for example, when it is not know which variables are relevant to understanding the phenomenon or when it is unclear what the likely relationships are between the variables.

Explanatory research is conducted to examine hypothesised relationships between variables, and, thus, relies on existing knowledge of what the relevant variables are and which relationships are likely.

The literature review (chapter two) revealed a wealth of information regarding constructs relevant to e-Learning systems success and regarding the possible relationships between them. Therefore, this research was primarily explanatory. In particular, research question one (How can various facets of the concept of e-Learning system success be organised as a multidimensional framework?—see section 1.3) was addressed by identifying the relevant dimensions in the literature (the resulting framework is presented in Figure 2.5). Research question two (From the instructor and from the learner perspective, what are the dimensions of e-Learning system success in an organisational context, and how do they relate to each other?) was addressed by testing the hypotheses regarding how the dimensions affect each other, formulated based on the literature (chapter three and chapter four are devoted to stating and justifying the hypotheses, while the results of hypothesis testing are presented in chapter six).

5.2.4 Causal versus correlational

Research, can be viewed as causal or correlational (Lunenburg, 2008). A causal study attempts to establish a cause and effect relationship, where the researcher intends to understand the definitive cause of a problem, while a correlational study establishes a mathematical relationship between two variables without asserting the reasons for the relationship (Sekaran, 2006).

Research question two of this research (From the instructor and from the learner perspective, what are the dimensions of e-Learning system success in an organisational context, and how do they relate to each other?—see section 1.3) suggests that this research is causal, as the focus is on how some of the dimensions of e-Learning systems success cause changes in other dimensions (I follow DeLone and McLean (1992) in defining a multidimensional model as a model employing multiple dimensions and the relationships between them) (see section 2.5). Nonetheless, a method that would establish cause-effect relationships with a high degree of certainty (e.g., a controlled experiment or a longitudinal study) was not feasible to implement. The research method employed (a cross-sectional survey with subsequent PLS structural equation modelling analysis, see section 5.6) is limited in its ability to distinguish cause from effect or to distinguish when correlations are spurious (are due to a common cause). These limitations are because in a cross-sectional survey all data is collected at the same time. Thus, the validity of the conclusions depends, to a large extent, on whether the hypotheses formulated in chapters three and four were formulated correctly.

5.2.5 The unit of analysis and the time horizon of the research

The multidimensional framework of e-Learning systems success that was formulated based on the literature in chapter two (section 2.4.5) suggested that instructors and students are major stakeholders in e-Learning systems success. Therefore, the units of analysis for this research were instructors and learners (more specifically, lecturers and students in New Zealand universities see section 5.3 for a detailed introduction of the populations).

In relation to a time horizon, a study can be longitudinal or cross-sectional (Sekaran, 2006). To get an insight into how the situation develops in time, or to get better evidence of cause-effect relationships (as cause happens before effect), a study involving measurement at more than one point in time—a longitudinal study—can be considered (Sekaran, 2006). In a longitudinal study, the same participants need to be available for several sessions of data collection. Attrition of participants is a major risk in longitudinal studies.

A cross-sectional study, with all data collected at the same time, was both feasible and sufficient to address the research question two in this research. A longitudinal study would offer somewhat stronger evidence for cause-effect relationships, but was not feasible because of financial and time constraints, and because potential risks to validity due to attrition of participants were judged to be too high.

5.3 Population and sample

5.3.1 The organisational context

New Zealand universities were chosen as an organisational context for this research because they widely practise e-Learning and because, unlike most other organisations, they put a lot of information about their activities in the public domain. In particular, the information about lecturers (including their contact details), programmes, and papers (often, including indications of the extent to which e-Learning is used) is accessible through publicly available web sites.

To test the e-Learning systems success framework formulated in this research, I needed instructor respondents and learner respondents. Instructor respondents were lecturers from the colleges of education in New Zealand universities, and learner respondents were level one university undergraduate students enrolled in IT related papers during the second semester of 2010 at New Zealand universities.

The choice of respondents to a large extent was dictated by considerations of feasibility. For example, it would be interesting (and, possibly, more informative) to conduct a true multilevel study covering some instructors and the learners they are responsible for at the same time. This, however, was not possible to do by relying on quantitative research methodology because of the difficulty of finding a sufficiently large number of instructors who would both provide data about themselves and would be able to allow access to their learners for the purpose of this research. Therefore, I chose not to conduct a multilevel study, but rather chose a population of instructors and a population of learners who were reachable for the purpose of conducting this research. Both the population of instructors and the population of learners chosen for this research were engaged in e-Learning in the same organisational context.

5.3.2 Study from the instructor perspective

Population refers to the entire group of people, events or things that a researcher wishes to investigate (Sekaran, 2006). The population is a group of potential participants to whom we want to generalise the results of a study. The target population in the study with instructors was the university lecturers within the colleges of education of universities in New Zealand (as listed in Table 5.1). Colleges of education were selected because they offer online courses or courses which have online components. This was determined by examining course details available on the official university websites. According to information accessible on publicly available web sites of the relevant universities, the total population was 775 academics involved in teaching (N= 775). The details are given in Table 5.1. The information was obtained at the time of survey, that is, in August 2010. This research did not cover Lincoln University which does not have a college of education. The sampling frame was 775 lecturers listed in the academic staff lists published on the official university web sites. Thus, the sampling frame was the same as the population, so that the survey was, effectively, a census.

Table 5.1 Distribution of the Instructor Population by University

University	Number of lecturers
Auckland University of Technology	22
Massey University	109
University of Auckland	190
University of Canterbury	158
University of Otago	70
University of Waikato	143
Victoria University of Wellington	83

Note: Lincoln University was excluded as it does not have a college of education.

5.3.3 Study from the learner perspective

The target population in the study from the learner perspective was level one university undergraduate students enrolled in IT related papers (which are offered totally online or have online components) during the second semester of 2010, at all eight New Zealand universities. This population was chosen for pragmatic and ethical reasons as completing an online survey was seen as an activity relevant to the course and, thus, contributing to learner experience in the course. Therefore, lecturers in such courses were seen as more likely to agree to place a web link to the survey at their course web sites. In addition, lecturers in such courses were technology-savvy, and had the necessary technical skills to place a web link to the survey on their course web sites.

The papers that came under this category were identified based on the information available on the official university websites in July 2010. A request via email was first sent to the paper coordinators to get their consent to undertake the research with the students enrolled in their papers. It was found that 24 IT related papers were offered in the second semester of 2010. Out of that number, the coordinators for 17 papers agreed to post the survey on their course websites. Paper coordinators who agreed to participate made available the information about the number of students enrolled in their papers. By extrapolating these data, the population for this was estimated at about 2,800 students.

All of the participating paper coordinators put the survey URL on their class web sites. It was not possible to verify if all students who enrolled in the papers saw the link. Also, it was not possible to guarantee that some of the students were not enrolled in more than one paper participating in the survey at the same time (so that the actual number of students covered by the survey may have been less than the 2,800 calculated based on enrolment numbers). Thus, to an extent, the survey sample was a convenience sample.

5.4 Survey instrument development

The main method of research inquiry in this research is quantitative. This involved using survey questionnaires in collecting data from the two cohorts of study participants: instructors and students. The survey questionnaire was used because it is an efficient data collection method that can be administered to a larger number of individuals, at a lesser cost and in a shorter time when compared to other methods of data collection (such as interviews). Further, a number of researchers in e-Learning systems success literature demonstrated the utility of collecting data via survey questionnaires (Chiu et al., 2005, Chiu, Chiu, et al., 2007, Chiu & Wang, 2008; Lee & Lee, 2008; Roca et al., 2006; Roca & Gagne, 2008; Wang et al., 2007).

This research involved the use of online and hard copy mail survey questionnaires. The online survey has advantages such as speed of data collection and reduction of costs when compared to mail surveys. However, the recipients may overlook email invitations, and some of the participants may consider a paper-based questionnaire easier to complete than an online survey. Therefore, a mailed questionnaire was used as the second reminder in the study from the instructor perspective to reach potential study participants who did not respond to the initial invitation and the first reminder (by email invitation) to improve the response rate. In the study from the learner perspective, individual addresses of potential participants were not available, so reminders were not sent and the only mode available was an online survey available to the potential participants as a link on a course web site.

The reliability and validity checks were carried out to verify the measures worked well in the particular context of my research. Also, a content validity study with experts (see section 5.4.3), as well as pre-tests and pilot tests were carried out to detect any problems with the measures. Sections 5.4.1 to 5.4.4 present a detailed discussion of the process of instrument development for both of the surveys.

5.4.1 Survey instrument development: Study from the instructor perspective

In the instructor survey, most of the measurement items for constructs in Figure 3.2 were obtained from the literature (sources are listed in Table 5.2). The process carried out to establish content validity of measurement items is discussed in section 5.4.3. As a result of the content validity study, the survey instrument was finalised with revisions and refinements based on the expert comments. Based on the results of the content validity survey (see section 5.4.3), four items were added to the existing measures, including DQ4 for quality of the e-Learning development and implementation process, SQ7 and SQ8 for quality of the e-Learning system, and SUI8 for instructor use of the e-Learning system (see Table 5.3). In addition, changes were made to some of the initial items. The resulting 49 measurement items for the eight constructs are shown in the Table 5.3.

Table 5.2 Sources of Measurement Instruments for the Instructor Survey

Construct	Prior research
Quality of the e-Learning system	Wang and Wang (2009); Wang et al. (2007)

Quality of the institutional support to instructors	Selim (2007)
Quality of the e-Learning content	Chiu, Chiu, et al. (2007
Quality of the instructor support to learners	Lee and Lee (2008); Selim (2007)
Instructor satisfaction	Chiu, Chiu, et al. (2007)
Instructor self-efficacy	Artino (2007); Compeau et al. (1999); Wang and Wang (2009)
Instructors use of e-Learning system	Mahdizadeh et al. (2008); Wang and Wang (2009)

There was no measure for quality of the e-Learning development and implementation process available in the literature. Items DQ1, DQ2, DQ3, and DQ5 were developed based on the benchmarking criteria given in Phillips and Merisotis (2000). The remaining item (DQ4) was suggested by experts in the content validity study. Clearly, the concept quality of the e-Learning development and implementation process is highly complex and, possibly, multidimensional. The present study focused on the content of the construct relating to evaluation and assessment because Samarawickrema and Stacey (2007) found evaluation and assessment to be a particularly important aspect of the process: DQ1 focused on the practice of evaluating the consequences of introducing and practicing e-Learning at the organisation, DQ2—on the extent to which the results of such evaluations are used to make improvements, DQ4—on the involvement of instructors in shaping how e-Learning is used, and DQ5—on instructors' satisfaction by the organisation's e-Learning program. Item DQ3 referred to innovative uses of technology explicitly taken into account (an item referring explicitly to innovative uses of the e-Learning system as opposite to using technology that is not a part of the system would target the intended meaning more precisely; nonetheless, an item that is broader in meaning was used to ensure that the wording is concise and easy for the respondents to understand).

The items ISI2 to ISI6 for quality of the institutional support to instructors construct, items CQ1 to CQ5 for quality of the e-Learning content construct, and items ISS1, ISS2, ISS5, and ISS6 for quality of the instructor support to learners construct were developed based on the benchmarking criteria given by Phillips and Merisotis (2000), and added to the items taken from literature sources listed in Table 5.2.

The operationalisation of e-Learning system use by the instructors (items SUI1 to SUI8) relied on listing generic functions of e-Learning systems. To an extent, all of the functionalities mentioned are implemented in common learning management systems, such as Moodle (Moodle Community, 2012), or Blackboard (Blackboard, 2012). Nonetheless, I assumed that the respondents would interpret the items broadly, and when different information technologies provided by their organisation for the purposes of enabling e-Learning, would take into account all of the technologies (and, for example, if both discussion forum software functionality of a learning management system such as Moodle and a standalone video conferencing system, such as Adobe Connect (Adobe, 2012), are used to enable collaboration between students, would take both into account when answering item SUI8). The reason for relying on generic functions to formulate the items was that the details of e-Learning systems at different organisations were not known (and, indeed, it turned out that some of the organisations used non-standard systems developed in-house, see section 6.3.8). I did not present the full definition of what constitutes an e-Learning system in the survey instrument, because it is rather complex and could have confused the respondents; rather, I assumed that the respondents would interpret the term e-Learning systems as a set of technologies provided by the organisation explicitly for the purposes of e-Learning, consistently with the conceptualisation of e-Learning system used in the present study. The extent to which this assumption was correct was judged by analysing the free form comments provided by the respondents (see section 6.3.8).

5.4.1.1 The questionnaire

The questionnaire was divided into nine sections from A to I (see Appendix B). The first section of the questionnaire (Section A) consisted of five items to solicit respondents' attitudes and perceptions about quality of the e-Learning development and implementation process in the respective institutions. The next section (Section B) contained eight items to determine the respondents' feelings about quality of the performance of the e-Learning system itself (the technical system). Quality of the support provided to instructors by the institution in relation to teaching online (Section C) was measured by six items. Section D was designed with six items to measure quality of the e-Learning content provided by the instructor via the e-Learning system, whilst Section E contained eight items designed to determine the perceptions of respondents towards quality of the service provided by the instructors to learners involved in e-Learning. The next section (Section F) consisted of three items devoted to measuring instructor satisfaction with e-Learning. The sixth section (Section G) contained five items that measured the instructors' perceived self-efficacy, and Section H consisted of eight items to measure the extent of instructor use of the e-Learning system. The final section, (Section I), was devoted to the collection of personal and background information of participating instructors, using five items.

With the exception of Section I (the demographics section), the questionnaire used a seven point Likert scale. The respondents were to specify their attitudes by giving their level of agreement/disagreement to some given statements, assigning a rating of one if they strongly disagreed with the given item or seven if they strongly agreed (1=Strongly disagree, 7=Strongly agree). The seven point Likert scale is a commonly used psychometric scale for measuring attitudes in survey research (Malhotra, 2010) and has been widely used in IS and e-Learning success studies (Chiu et al., 2005; Lee & Lee, 2008; Roca et al., 2006; Roca & Gagne, 2008; Wang et al., 2007). For the questionnaire used in the instructor survey, refer to Appendix B.

The disadvantages of collecting data via self-administered questionnaires with fixed answer format are low response rates and lack of opportunity for respondents to raise questions or to provide information that does not fit the format or the content of the questions. To overcome this limitation, reminders were sent to improve response rates, and open-ended questions were added to increase the breadth and the depth of the information obtained. Open-ended questions are introduced in more detail in section 5.4.1.2. Demographic information was also collected, and included age, gender, position, teaching experience, and online teaching experience.

Table 5.3 The Constructs and their Measurement Items Used in the Instructor Survey.

Preamble[a]	Code	Measurement items

Preamble[a]	Code	Measurement items
Quality of the e-Learning development and implementation process		
The following statements characterise how your institution manages the e-Learning development and implementation process at your institution. Please tick the answer which best reflects your opinion.	DQ1	The e-Learning programme's educational effectiveness is measured using several methods.
	DQ2	An evaluation process is used to improve the teaching/learning outcomes.
	DQ3	Successful and innovative uses of technology for teaching are taken into account when measuring effectiveness of the e-Learning programme.
	DQ4	Instructors are involved during the initial stages of the development of the e-Learning programme.
	DQ5	Instructor satisfaction with the e-Learning programme is evaluated by regular surveys.
Quality of the e-Learning system		
The following statements describe the capabilities of the e-Learning system at your institution. Please tick the answer which best reflects your opinion about system capabilities in relation to using the e-Learning system in your courses.	SQ1	The e-Learning system allows me control over my teaching activities.
	SQ2	The e-Learning system offers flexibility as to time and place of use.
	SQ3	The e-Learning system provides functions I need to successfully conduct my teaching activities.
	SQ4	The e-Learning system has well-designed user interfaces.
	SQ5	The e-Learning system provides high-speed information access.
	SQ6	The e-Learning system is robust and reliable.
	SQ7	Steps to complete a task (e.g. uploading and maintaining files) in the e-Learning system follow a logical sequence.
	SQ8	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.
Quality of the institutional support to instructors		
The following statements describe the e-Learning support services provided to you as a teacher. Please tick the answer which best reflects your opinion.	ISI1	Technical assistance in course development is available to us.
	ISI2	We are encouraged to use technical assistance in course development.
	ISI3	We are assisted in the transition from traditional classroom teaching to teaching with the use of e-Learning.
	ISI4	To facilitate the sharing of e-Learning expertise and experiences, we are encouraged to engage in peer-to-peer mentoring.
	ISI5	e-Learning instructor training continues throughout the progression of the online class.
	ISI6	We are provided with written resources to deal with issues arising from student use of electronically accessed data.

Preamble[a]	Code	Measurement items
		Quality of the e-Learning content
The following statements characterise the e-Learning content in your courses in terms of its accuracy, relevance, comprehensibility, timeliness. Please tick the answer which best reflects your opinion.	CQ1	Courses are designed with a consistent structure that is easily understandable to students of varying learning styles.
	CQ2	e-Learning instructional materials are reviewed periodically to ensure they meet programme standards.
	CQ3	Students are provided with course information via the e-Learning system that outlines the course objectives, concepts, and main ideas.
	CQ4	Learning outcomes provided via the e-Learning system are summarised in clearly written, straightforward statements.
	CQ5	e-Learning activities for students are designed to encourage students to work in groups utilising problem-solving activities to develop topic understanding.
	CQ6	Students have access to up to date information via the e-Learning system.
		Quality of the instructor support to learners
The following statements characterise the support you provide to your students involved in e-Learning. Please tick the answer which best reflects your opinion.	ISS1	Student interaction with instructors via the e-Learning system is facilitated through a variety of ways.
	ISS2	Student interactions with other students via the e-Learning system are facilitated through a variety of ways.
	ISS3	Instructors clearly explain how communication via the e-Learning system should be used.
	ISS4	Students are encouraged to work with each other and instructors.
	ISS5	Answers to questions posted via the e-Learning system are constructive.
	ISS6	Answers to questions are provided in a timely manner.
	ISS7	Instructors manage student expectations over the type and timeliness of responses to student communications.
	ISS8	I have the ability to solve students' problems relating to using e-Learning in my courses.
		Instructor satisfaction
The following statements characterise the degree of your satisfaction with using the e-Learning system in your courses. Please tick the answer which best reflects your opinion.	ISAT1	I am satisfied with the performance of the e-Learning system.
	ISAT2	I am pleased with the experience of using the e-Learning system.
	ISAT3	The decision to use the e-Learning system was a wise one.
		Instructor self-efficacy
The following statements characterise your confidence in successfully delivering courses online. Please tick the answer which best reflects your opinion.	ISEF1	I am confident that I can use the e-Learning system for online teaching even if I have no previous experience with using some of the features that I need to use.
	ISEF2	I am confident that I can use the e-Learning system even if there is no one around to show me how to use it.
	ISEF3	I am confident that I can use the e-Learning system even if I have only the user manual for reference.
	ISEF4	I am confident that I can integrate the functions of the e-Learning system with my teaching plan.
	ISEF5	I am confident that I have adequate ability to operate the e-Learning system.

Preamble[a]	Code	Measurement items
		Instructor use of the e-Learning system
The following statements characterise the extent to which you use the e-Learning system in your courses. Please tick the answer which best reflects your opinion.	SUI1	I use e-Learning system to communicate with my students.
	SUI2	I use e-Learning system to distribute course assignments to my students.
	SUI3	I encourage my students to submit their assignments using e-Learning system.
	SUI4	I use e-Learning system to distribute course materials to my students.
	SUI5	I use e-Learning system to execute student assessments
	SUI6	I use e-Learning system to issue the grades of my students.
	SUI7	I encourage my students to discuss the course with one another through the e-Learning system.
	SUI8	I use e-Learning system to encourage peer-to-peer collaboration between students in their studies.

[a]In the questionnaire, to ensure that items are easy to read, each set of items was introduced by a statement establishing the context. Therefore, the context is not restated in each item and, for example, items ISI1 and ISI2 of institutional support for instructors do not explicitly restate that technical assistance refers to technical assistance with using the e-Learning system.

5.4.1.2 Qualitative data collection

One open-ended question for each construct was added to the questionnaire to gather the opinions of instructors about each success dimension in the model. Also, one more open-ended question was added at the end of the questionnaire, before the demographics section, to seek the respondents' opinions regarding whether there were any e-Learning systems success dimensions not mentioned in the questionnaire. The qualitative data collection in the study from the instructor perspective followed a $QUAN(+qual)$ design of data collection (Creswell, 2009). The quantitative method was accorded priority, while the qualitative method was used to contribute to interpreting the quantitative results. The majority of the discussion is generated from the quantitative data, with qualitative data helping to enrich the quantitative findings. The items used to collect qualitative data are presented in Table 5.4 and can be seen in context in Appendix B.

Table 5.4 Open-ended Questions Used to Collect Qualitative Data in the Instructor Survey.

Construct	Code	Item
Quality of the e-Learning development and implementation process	QUAL1	Please comment on your answers above or suggest any other features of your institution's e-Learning development and implementation process that may be relevant to e-Learning success in your courses.
Quality of the e-Learning system	QUAL2	Please comment on your answers above or suggest any other attributes of your institution's e-Learning system that may be important for e-Learning success in your courses.
Quality of the institutional support to instructors	QUAL3	Please comment on your answers above or suggest any other aspects of overall support provided by your institution to you as a teacher that may be relevant to e-Learning success in your courses.
Quality of the e-Learning content	QUAL4	Please comment on your answers above or suggest any other aspects of e-Learning course content in your courses that may be relevant to e-Learning success.
Quality of the instructor support to students	QUAL5	Please comment on your answers above or suggest any other aspects of instructor support in your courses that may be relevant to e-Learning success.
Instructor satisfaction	QUAL6	Please comment on your answers above.
Instructor self-efficacy	QUAL7	Please comment on your answers above.
Instructor use of the e-Learning system	QUAL8	Please comment on your answers above or suggest any other aspects of e-Learning system use by instructors in your courses that may be important for e-Learning success.
	QUAL9	Please suggest any other factors (not covered by questions in this survey) that you think are important in determining and demonstrating e-Learning success in your courses.

5.4.2 Survey instrument development: Study from the learner perspective

As in the instructor survey, the data for this phase was gathered by means of a questionnaire survey. Table 5.5 presents the sources of measurement items for the survey from the learner perspective. Similar to the instructor survey, for the study from the learner perspective, the items were obtained from prior literature. As in the survey for the study from the instructor perspective, items SQS5 and SQS6 were added to the measure for quality of the e-Learning system, and item INSL2 was added to the measure for quality of the institutional support to learners.

Table 5.5 Sources of Measurement Instruments for the Student Survey

Construct	Prior research
Quality of the e-Learning system	Wang and Wang (2009); Wang et al. (2007)
Quality of the institutional support to learners	Selim (2007)
Quality of the e-Learning content	Chiu, Chiu, et al. (2007); Lee and Lee (2008)
Quality of the instructor support to learners	Lee and Lee (2008); Selim (2007)
Learner satisfaction	Chiu, Chiu, et al. (2007)
Learner self-efficacy	Artino (2007); Compaq et al. (1999)
Learner use of the e-Learning system	Wang et al. (2007)
Level of learning	Rovai et al. (2009)
Learner intention to continue e-Learning	Chiu, Chiu, et al. (2007)

The items INSL1 and INSL3 for quality of the institutional support to learners construct, items CQ1 to CQ3 for quality of the e-Learning content construct, and items ISSS1, ISSS2, and ISSS4 to ISSS7 for quality of the instructor support to learners construct were developed based on the benchmarking criteria given in Phillips and Merisotis (2000), and added to the items taken from literature sources listed in Table 5.5.

Questionnaires can contain either structured close-ended questions or unstructured open-ended questions, and the questionnaire used in the study from the instructor perspective used both types of questions (see section 5.4.1). Nonetheless, the questionnaire used in the study from the student perspective contained only close-ended questions. By using close-ended questions, students were constrained from providing negative comments about their institutions or instructors.

Table 5.6, below, shows the measurement items in the final version of the questionnaire. There were 10 constructs and 49 items for measuring them, together with four items to collect demographic information. The structural model for these 10 constructs, with the justification of the relationships among them, was presented in chapter four. The questionnaire was divided into 11 sections from A to K (see Appendix G). Section A measured the extent of instructor use of the e-Learning system, and Sections B, C, D and E looked into the perceived quality, namely quality of the e-Learning system, quality of the e-Learning content, quality of the instructor support to learners, and quality of the institutional support provided to learners. Section F was devoted to the measurement of learner satisfaction with e-Learning, while Section G consisted of items to measure level of learning. The learner intention to continue e-Learning in the future is measured by three items in Section H. Self-efficacy construct affecting the individual behaviour identified in the literature were included in the research model and section I had items to measure learner self-efficacy. Section K provided four items to collect learners' demographic data.

The questionnaire used in this phase also used a seven point Likert scale (except for the demographics section). Seven point Likert scales are very common in e-Learning system success studies carried out to measure learner perspectives (Lee & Lee, 2008; Wang et al., 2007). The scales range from 1=Strongly disagree to 7=Strongly agree. In order to establish the reliability and validity of the measurement instrument, pretesting, expert opinions and pilot testing were used as explained in section 5.4.1 in relation to the study from the instructor perspective. A detailed discussion of the process carried out to establish the content validity of measurement instruments is presented in section 5.4.3.

Table 5.6 The Constructs and their Measurement Items Used in the Student Survey

Preamble[a]	Code	Measurement items
Learner use of the e-Learning system		
The following statements characterise the extent to which you use the e-Learning system in this paper. Please tick the answer which best reflects your opinion.	SUS1	I use the e-Learning system frequently to study in this paper.
	SUS2	In most cases, I use the e-Learning system, because I choose to, not because I have to.
	SUS3	I use the e-Learning system a lot.
Learner satisfaction		
The following statements characterise the degree of your satisfaction with e-Learning in this paper. Please tick the answer which best reflects your opinion.	SSAT1	I am satisfied with the performance of the e-Learning system.
	SSAT2	I am pleased with the experience of using e-Learning.
	SSAT3	I think e-Learning is a good idea.
	SSAT4	I think the decision to use e-Learning is a wise one.
Quality of the e-Learning system		
The following statements describe the capabilities (e.g. ease of use, accessibility, reliability) of the e-Learning system used in this paper. Please tick the answer which best reflects your opinion about the system capabilities in relation to your learning activities.	SQS1	e-Learning system offers flexibility as to time and place of use.
	SQS2	e-Learning system has well-designed user interfaces.
	SQS3	The e-Learning system provides high-speed information access.
	SQS4	e-Learning system is robust and reliable.
	SQS5	Steps to complete a task in the e-Learning system follow a logical sequence.
	SQS6	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.
Quality of the e-Learning content		
The following statements characterise the quality of the e-Learning content in this paper in terms of its accuracy, relevance, comprehensibility, timeliness. Please tick the answer which best reflects your opinion.	CQS1	Students are provided with information about the paper via the e-Learning system that outlines paper objectives, concepts, and main ideas.
	CQS2	Learning outcomes for the paper provided via the e-Learning system are summarised in clearly written, straightforward statements.
	CQS3	e-Learning in this paper is designed to encourage us to work together utilising problem-solving activities to develop topic understanding.
	CQS4	The e-Learning content in this paper is communicated well.
	CQS5	The e-Learning system provides up-to-date content for this paper.

Preamble[a]	Code	Measurement items
Quality of the instructor support to learners		
The following statements characterise the instructor support provided to you in relation to e-Learning in this paper. Please tick the answer which best reflects your opinion.	ISSS1	Student interaction with instructor is facilitated through a variety of ways.
	ISSS2	Student interactions with other students are facilitated through a variety of ways.
	ISSS3	Instructors clearly explain how communication channels should be used during a course.
	ISSS4	Students are encouraged to work with each other and instructors.
	ISSS5	Instructors manage student expectations over the type and timeliness of responses to student communications.
	ISSS6	Feedback to assignments and questions is constructive.
	ISSS7	Feedback to assignments and answers to questions are provided in a timely manner.
	ISSS8	Instructors have the ability to solve the student problems relating to using e-Learning in the course.
Quality of the institutional support to learners		
The following statements describe the e-Learning support services provided to you. Please tick the answer which best reflects your opinion.	INSL1	Students are provided with information to aid them in accessing materials provided in digital form.
	INSL2	Students are able to practise with any relevant technologies prior to commencing a course.
	INSL3	Easily accessible technical assistance is available to all students throughout the duration of a course/programme.
	INSL4	Students have access to sufficient library resources accessible through the world wide web.
	INSL5	Students can register online for courses.
Learner self-efficacy		
The following statements characterise your confidence in your ability to successfully learn the materials presented in this paper online. Please tick the answer which best reflects your opinion.	SSEF1	I could complete my learning activities using the e-Learning system if I had never used such a system.
	SSEF2	I could complete my learning activities using the e-Learning system even if I have only the online instructions for reference.
	SSEF3	I could complete my learning activities using the e-Learning system if I had seen someone else using it before trying it myself.
	SSEF4	I could complete my learning activities using the e-Learning system if I had just the built-in-help facility for assistance.
Level of learning		
The following statements characterise the level of learning that can be achieved by using the e-Learning system in this paper. Please tick the answer which best reflects your opinion.	SL1	I can organise course material into a logical structure.
	SL2	I can intelligently critique the texts used in this course.
	SL3	I have changed my attitudes about the course subject matter as a result of this course.
	SL4	I feel more self-reliant as the result of what I learned in this course.

Preamble[a]	Code	Measurement items
		Intention to continue e-Learning
The following statements characterise your intention to use e-Learning in the future based on your experience in this paper. Please tick the answer which best reflects your opinion.	CI1	If I could, I would like to continue using e-Learning in my learning activities in the future.
	CI2	I will continue using e-Learning as much as possible in my learning activities in the future.
	CI3	I intend to increase the use of e-Learning in my learning activities in the future.

[a]In the questionnaire, to ensure that items are easy to read, each set of items was introduced by a statement establishing the context. Therefore, the context is not restated in each item and, for example, most of the items of quality of the instructor support to learners do not explicitly restate that technical assistance refers to technical assistance with using the e-Learning system.

5.4.3 Content validity study

The content validity study carried out to establish the validity of the measurement items in the study from the instructor perspective and in the study from the learner perspective is presented in this section. A four step process was employed in this research to confirm content validity of measurement instruments (see Figure 5.1).

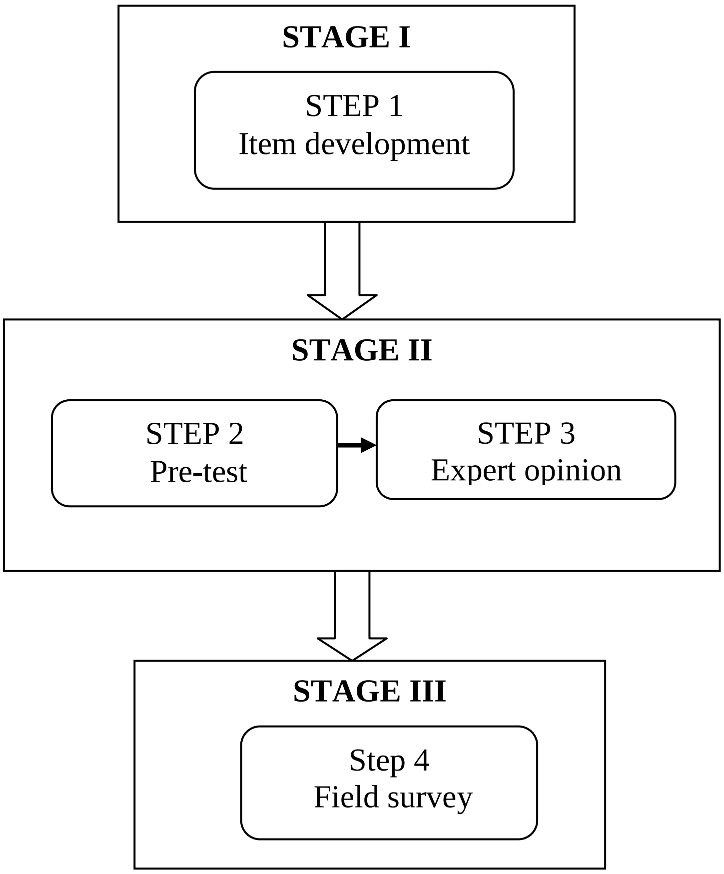


Figure 5.1 Instrument validation process used in this research.

Step 1: Item development. In the construction of measurement items for a construct, the items should cover the content of the construct correctly, and should cover all of the content of the construct (Lewis, Templeton, & Anthony, 2005). This can be achieved by conducting an extensive literature review (Bhattacherjee, 2002) and by complementing this literature review with feedback obtained from an expert panel (Walker & Fraser, 2005). Accordingly, an item pool was identified to reflect each construct from prior studies. Wording changes were made for some items to relate them specifically to this research. The item pool was drafted and improved through multiple iterations to produce the final version of the instruments.

Step 2: Pre-test. The drafted instrument items for the instructor survey and the student survey were given to 12 PhD students who were involved with research relating to information systems, to find any problems in the initial version of the instrument. The members of the panel were asked to critique format, content, comprehensibility, and clarity. In addition, they were asked to give suggestions for improvements as well as identify problematic items. Small wording changes were made according to the feedback, no items were deleted.

Step 3: Expert opinion. The refined version of the instrument was submitted to a group of seven e-Learning lecturers and practitioners involved in e-Learning, to obtain their opinions about whether the instrument was valid for assessing the dimensions of e-Learning systems success. The participants were asked to evaluate the items with regard to their relevance to the construct based on a three-point scale: *Not relevant*, *Important (but not essential)*, and *Essential* (Lawshe, 1975). Besides evaluating the items, the experts were asked to comment on the items and suggest addition or removal of any items. Revisions were carried out according to the panel's recommendations, including decomposing double-barrelled questions, reconciling overlaps between items, making content clarifications, and correcting grammar. Based on the feedback from the experts, four items were added to the instrument used in the survey with instructors, and three items to the instrument used in the survey with the students, as discussed in sections 5.4.1 and 5.4.2, respectively.

Step 4: Field survey. The new version of the instrument reflecting the input of the panel of experts was administered to a group of e-Learning practitioners and researchers for another round of content validity. In this step, screening of items using a quantitative procedure was carried out to determine whether the items represented the content domain of the construct (Lawshe, 1975). In this phase, the instruments were sent to 58 e-Learning experts (researchers and practitioners). The list of experts was obtained from a previous e-Learning conference (DEANZ, 2008). The experts were from New Zealand, Australia, and the United States. Out of the 58 experts, 43 responded resulting in a 74% response rate. Each of the items was evaluated by experts using a three point Likert scale as given in Lawshe (1975): (1) *Not relevant* (2) *Important (but not essential)* (3) *Essential*. In addition to quantitative assessment, open-ended questions were included in the questionnaire to obtain comments from experts about the measurement items or for them to suggest new items. Items were tested according to the statistical procedure suggested by Lawshe (1975). No items were dropped or added as the result of this procedure. The finalised versions of the instruments are given in sections 5.4.1 and 5.4.2.

5.4.4 Pilot study

A pilot study is a small scale version of the main study which is undertaken in order to improve the quality and the efficiency of measurement instruments (Kumar, 2005) and fix any mistakes in the instruments before the start of the main survey. Conducting a pilot study ensures that the problems which could occur during the main survey are addressed by the researcher. Thus, the pilot studies were conducted to test the data collection protocol, to test the validity of the wordings of the questionnaire and its layout, and to give an idea of the response rate that could be expected for the main survey. As mentioned by Cooper (2006), it is expected that about 25 subjects would be involved in a pilot study to obtain valid feedback from the respondents. A pilot study should follow the same procedures that are designed for the main survey. In other words, a pilot study is a small scale version of the main survey.

5.4.4.1 Pilot Study: Study from the instructor perspective

The pilot study for the study from the instructor perspective was carried out with 5% of the target population for the main survey. An email invitation with the link to the online survey was sent to 48 instructors covering all the universities in New Zealand (except Lincoln University). To obtain an unbiased sample for the pilot study, selection of participants was done using simple random sampling technique. With one email reminder and another hard copy reminder (the same sequence as later used in the main survey) the pilot study produced a 64% response rate. As no problems were detected, the data obtained in the pilot study was merged with the main survey data.

5.4.4.2 Pilot study: Study from the learner perspective

The survey instrument for the study from the learner perspective was pilot tested with a student sample of 26 students. An 88.5% response rate was achieved in the pilot. No problems were detected. The students participating in the pilot were not from the target population, so the data obtained in the pilot was discarded.

5.5 Approach to data collection

This section introduces the survey administration procedures, first for the survey with the instructors, and then for the survey with the learners.

5.5.1 Data collection: Study from the instructor perspective

The study from the instructor perspective was conducted in colleges of education at all New Zealand universities (excluding Lincoln University which does not have a college of education) over a two month period in September and October of 2010.

The survey instrument was made available to participants using a web based survey tool. Email invitations were sent to the participants requesting their participation in the survey (see Appendix D). The link to the survey and a token number were provided in an email message that allowed the participants to access and open the survey. Further, a link to the information sheet (which outlined the study purpose, methodology and research ethics) was embedded in the message (see Appendix C for the information sheet). The token number was provided to the participants to keep track of who completed the survey without breaking the confidentiality (using functionality provided by the survey software). The questionnaire could be completed by respondents within approximately 10 minutes.

After two weeks, an email reminder message with the link to the survey was sent to the participants who had not completed the survey (see Appendix E). After another two weeks from the date of the first reminder, a second reminder was sent to the non respondents via regular mail (see Appendix F). The letter included a cover letter explaining the importance of the study, the survey questionnaire, together with a postage paid return envelope. The link to the online survey was also given in the cover letter.

5.5.2 Data collection: Study from the learner perspective

In this study, an informal approach via email was first made to the paper coordinators of first year information technology related papers offered in semester two, 2010, in all New Zealand universities. Information about the papers was obtained from the official websites of New Zealand universities in July 2010. An email explaining the research in detail was sent to 24 paper coordinators, of which 17 agreed to post the survey URL on their course websites.

A message explaining the importance of the study along with the link to the survey and the information sheet was made available to the students enrolled in those papers via the course websites (see Appendix H and I). Data were collected over the period of two months, in August and September of 2010. In this survey, participants were anonymous and there were no reminders. The data collected did not include information about the university of the respondent or the paper in which the respondent was enrolled. This was to ensure that the data could not be misused to make comparisons between papers or between universities.

5.6 Approach to quantitative data analysis

This section provides a description of the quantitative data analysis approach used in this research. First, I checked for data entry errors, missing data, and outliers. Then, I analysed and presented descriptive statistics for all of the survey items. Finally, I tested the research model, which included testing the measurement model and testing the structural models.

SPSS version 18 and SmartPLS version 2.0 were the statistical data analysis software used in this research. PLS technique was used to test the measurement and the structural models. PLS technique (Tenenhaus, Vinzi, & Lauro, 2005) is in common use in MIS research (Gefen & Straub, 2000). Recently, the use of PLS (particularly, with very small samples) was criticised (Marcoulides & Saunders, 2006) on the grounds of low statistical power and biased estimates. These criticisms, however, were countered in later publications (Sosik, Kahai, & Piovoso, 2009; Hair, Ringle, & Sarstedt, 2011), with the assertions that PLS is a useful and valid approach when the results are interpreted appropriately. The rationale to use PLS in this research is discussed in the following paragraphs.

PLS results are easy to compare with other MIS and e-Learning studies. Because PLS is in common use in the MIS field, in general, (Gefen & Straub, 2000) and in e-Learning research, in particular (see, for example, Lee & Lee, 2008; Raaij & Schepers, 2008; Sheng, Jue, & Weiwei, 2008; Yi & Hwang, 2003), it is easy to compare the results obtained via PLS with the results in the literature, so that the meaning of the results is better understood in the context of existing research.

PLS is the most viable approach for this study compared with the alternatives. The models tested in this research were relatively large and complex. The two alternatives to PLS most commonly used in MIS research are linear regression and co-variance based SEM (Gefen & Straub, 2000). The use of linear regression was not appropriate because of the complexity of the models. Co-variance based SEM was not appropriate because of the size of the model. On the other hand, Sosik et al. (2009) and Goodhue, Lewis, and Thompson (2006) recommend the use of PLS with large models. Moreover, covariance-based techniques are recommended for use with well-established models, while PLS is seen to be more appropriate for new models (Hensler, Ringle, & Sinkovics, 2009).

Low statistical power suggests that non-significant relationships should not be interpreted as absence of relationships. This issue is common for all inferential statistics techniques, and achieving high statistical power is often not feasible because of the sample sizes required (Cohen, 1988). This issue was explicitly investigated for PLS by Goodhue et al. (2006) using Monte Carlo simulations. Thus, care was taken to interpret non-significant results as (relatively weak) evidence consistent with the relationship not existing rather than as strong evidence of no relationship, as suggested by Goodhue et al.

5.6.1 Data screening

Quantitative analysis was conducted after screening the data for data entry errors and removing outliers (see Appendix M). Mahalonobis distance was used to detect outliers (0.95 confidence level was used). Then, following Hair et al., (2010), expectation maximisation was used to impute missing data (using SPSS software). Expectation maximisation (rather than mean substitution or listwise deletion) was used because it allows retaining statistical power while minimising the bias (Roth, 1994).

The multivariate normality of data was verified by checking multivariate normality of individual indicators using graphical method (normal probability plots and scatter diagrams). Although multivariate normality is not a requirement for PLS, if data is multivariate normal, it tends to produce more robust results (Marcoulides & Saunders, 2006).

5.6.2 Approach to testing the measurement models

The reliability and validity tests were performed in order to establish the robustness of the measurement instruments for this research. The strength of the measurement models was tested by means of item reliability, internal consistency reliability, convergent validity, and discriminant validity.

5.6.2.1 Item reliability

The reliability of an item reflects the extent to which the item value reflects the value of the estimate of the underlying construct provided by the measure (Gefen & Straub, 2000), and is given by the factor loading for the item. Hair et al. (2010) suggested a .5 cut-off value for factor loadings, and it was used in this research.

5.6.2.2 Internal consistency reliability

Internal consistency reliability refers to the extent to which the set of the items intended to measure a construct varies in concert, indicating that the items are likely to reflect a single underlying construct. Cronbach alpha and composite reliability are commonly used in SEM analysis to estimate internal consistency reliability. A Cronbach alpha coefficient above .7 indicates an acceptable level of reliability (Nunally & Bernstein, 1994). In this research, Cronbach alpha values were used to assess the internal consistency reliability of the measurement items, with the cut-off value of .7.

5.6.2.3 Construct validity

Validity of a measurement instrument refers to the ability of the measurement items to actually measure the constructs they are supposed to measure (Hair et al., 2010). As the true values of latent constructs cannot be obtained in principle, the validity cannot be assessed directly. On the other hand, there are a number of properties a measure can possess that can be seen as evidence (but not proof) of validity. In this research, as it is a common practice in SEM, convergent validity and discriminant validity are assessed to provide evidence of the measure validity.

5.6.2.4 Convergent validity

Convergent validity refers to the extent to which, in the context of a given model, the measurement items of a construct are similar to the other measurement items of the same construct (Phang, Sutanto, Kankanhalli, Yan, Tan, & Teo, 2006). Item reliability and internal consistency reliability constitute evidence of convergent validity. Further evidence is provided by average variance extracted (AVE), which corresponds to the average (across the items of the measure) variance in item value predicted by the underlying construct, as it is estimated in the model (Hair et al., 2010).

5.6.2.5 Discriminant validity

Discriminant validity, on the other hand, refers to the extent to which measurement items of a particular construct reflect this construct, rather than other constructs in the same model (Hulland, 1999). One way of demonstrating discriminant validity is by considering the factor loadings of measurement items on all constructs in the model. If all items load on their own construct are higher than all other constructs of the model, it constitutes evidence of discriminant validity (Thompson, Higgins, & Howell, 1991). Another way to test the discriminant validity of measurement items is to check, for each construct, if the square root of AVE value for each construct is greater than correlations of the construct with other constructs (Fornell & Larcker, 1981; Igbaria, Zinatelli, Cragg, & Cavaye, 1997). If this condition is met, constructs of the model explain more variance in their items than they share with each other.

5.6.3 Approach to testing the structural models

After validating the measurement model, the next step is to test the structural model to determine the model's overall explanatory power and to test the specific hypotheses regarding cause-effect relationships between constructs.

The explanatory power of the research models was assessed by examining the R^2 values. R^2 value is the fraction variance in a dependent variable explained by the variables affecting it. Cohen (1988) suggested that R^2 values of around 67% correspond to substantial explanatory power, R^2 values of around 33% correspond to average explanatory power, and values of around 19% correspond to weak explanatory power. However, Falk and Miller (1992) suggested that R^2 values above 10% correspond to substantive explanatory power.

Path coefficients indicate the strength of a cause-effect relationship between two variables (Wang & Chiu, 2011). Each hypothesised relationship corresponds to a path in the structural model. In PLS, the bootstrapping procedure is used to assess the significance of path coefficients β values (Chin, Marcolin, & Newsted, 2003). The bootstrapping procedure generates random samples of data based on the original sample. Five hundred bootstrap samples were used in this research, as recommended by Chin et al. (2003). The statistical significance of path coefficients was calculated using t-tests for bootstrap samples. The statistical significance level was set at 5% ($p < .05$), unless explicitly stated otherwise. Pallant (2011) and Tabachnick and Fidell (1996) suggested that path coefficients should be above .2 for the relationship to have a practical significance, thus imposing a more stringent requirement.

5.7 Approach to qualitative data analysis

As noted in section 5.2.2, the aim of qualitative data analysis was to gain a better understanding of the mechanism behind the relationships found to be significant in the quantitative analysis, thus addressing research question two (see section 1.3) in more depth. The embedded mixed research design by Cresswell (2009) was followed. Quantitative and qualitative data were collected simultaneously, with quantitative data analysis given priority. The analysis was conducted sequentially—I was aware of the results of the quantitative data analysis when analysing the qualitative data.

Qualitative data analysis was carried out by using the constant comparative method first introduced by Glaser and Strauss (1967). The analysis targeted the description and the initial understanding of the data, rather than full-scale grounded theory building. This use of the constant comparative method was suggested as a viable alternative to full grounded theory building by Straus and Corbin (2008). Similar use of the constant comparative method was reported in a number of e-Learning related studies (see, for example, Gamage, Tretiakov, & Crump, 2011; Jang, 2010; and, Seddon & Biasutti, 2009).

First, I read all of the data collected via open-ended questions in the survey instrument several times, every time in one sitting. Then, I reviewed the data carefully, line by line, to identify and to code initial themes (Charmaz, 2006). When a new theme was identified, a code was assigned to it. Each statement in the data was compared with the previously identified codes to ensure that similar themes were clustered together with the same code. I did not use software, such as Nvivo, but coded on paper, as I found that coding on paper allowed me to record ideas more naturally, without distractions caused by technology related issues. In the next stage, the codes and the corresponding data segments identified in the initial stage were compared and updated to build a coherent understanding. The resulting themes were presented as narrative in this thesis.

5.8 Ethical safeguards

Care was taken to ensure the wellbeing of the participants. This section describes the ethical safeguards adopted in the three surveys conducted in this research: the content validity survey (see section 5.4.3), the survey with instructors (see section 6.3), and the survey with learners (see section 6.4). The section concludes by outlining the formal approval procedures followed.

In all the surveys, an information sheet was supplied to the participants along with the survey instrument (see Appendix C and H). The information sheet listed the participants' rights, including: declining to participate, refusing to answer any particular question, asking any questions about the study at any time during participation, being given access to a summary of the findings of the study when it is concluded, and withdrawing from the research project at any stage. The information sheet included contact details of both the researcher and the Massey University Human Ethics committee (MUHEC).

All three surveys were anonymous at two levels: at participant level, and at institution level (information identifying the institution and, for the survey with learners, the paper of the respondent was not recorded). In addition, in the survey with learners, all questions were close-ended. Therefore, the data collected could not be misused to make comparisons between institutions or papers, and the student participants could not provide unsolicited details about their papers, lecturers, or institutions via the survey instrument.

In compliance with Massey University's procedures (MUHECb, 2010), first, screening questionnaires (MUHECc, 2010) were completed to determine the level of risk in the research. Based on the screening questionnaires, all of the surveys were judged to be in the low risk category according to the MUHEC classification. Next, a peer review was conducted, involving two Massey university lecturers. The peer review confirmed that the surveys should be classified as low risk and found the safeguards adopted to be appropriate and compliant with the Massey University Code of ethical conduct (MUHECa, 2010). Next, low risk notifications were completed and forwarded to the MUHEC. Finally, letters from the ethics committee were received stating that the surveys were recorded in the low risk database (see Appendix J, K, and L).

5.9 Summary

This chapter first described the overall approach used to empirically test the models developed in this research. The research employed mainly a hypothetico-deductive quantitative approach to validate the hypotheses generated from models developed in the previous chapters, with some elements of mixed method research (in the study from the instructor perspective) to enrich the quantitative findings. The research was an explanatory, cross-sectional study. The research included two studies in the same organisational context, the context of New Zealand universities—a study with an instructor as a unit of analysis and a study with a student as a unit of analysis.

In order to answer research question two of this research, the survey research method was used, employing self-administered questionnaires. The questionnaire for the study from the instructor perspective consisted of both open and close-ended questions (thus, both quantitative and qualitative data were collected); the questionnaire for the study from the learner perspective consisted of close-ended questions only. Content validity of the measurement instruments was demonstrated by employing a four-step process, including formulating an initial instrument based on the literature, a pre-test, a content validity test with a small group of experts, and a content validity test with a larger group of experts. Pilot tests with final versions of the instruments were also carried out. Both for the study from the instructor perspective and for the study from the learner perspective, data collection was carried out mainly online. The instructor survey was designed with one email reminder and one hard copy mail reminder. The student survey did not involve reminders. A number of data screening methods were used, including checking for data entry errors, testing for outliers, and omitting cases with too much missing data.

Data analysis was carried out mainly by using quantitative methods. The PLS technique was used in the quantitative analysis (this chapter includes a discussion of advantages and disadvantages of PLS and of the rationale for using it in this research). The reliability and validity measures included testing for item reliability, internal consistency reliability, as well as convergent and discriminant validity. Following standard practice in using PLS, model fit was judged via statistical significance and magnitude of path coefficients and via the percentage of variance explained in dependent variables. The constant comparative method was used to analyse the qualitative data obtained through open-ended questions in the instructor survey. The chapter concluded by discussing the ethical safeguards adopted in this research.

CHAPTER 6: RESULTS AND DISCUSSION

6.1 Introduction

The purpose of this chapter is to present the results of this research. The chapter begins with a discussion of data screening. Then, the analysis of the results for the two models is presented: first, for the model from the instructor perspective and then for the model from the learner perspective. For each model, the following aspects are discussed: response rate, non-response bias testing, and characteristics of the respondents. This is followed by the analysis of the measurement model and of the structural model. The overall results are followed by presenting and discussing, in view of the literature, the outcomes for the individual hypotheses (T1 to T12 in the model from the instructor perspective and S1 to S15 in the model from the learner perspective). The discussion of the results for the model from the instructor perspective also involves the results of constant comparative analysis of participants' answers to open-ended questions (such questions were not included for the model from the learner perspective).

6.2 Data screening

Data screening was conducted by following the procedures outlined in section 5.6.1. No outliers were found when checking for outliers by using Mahalonobis distance at .95 confidence level. Visual normality checks using probability plots and scatter diagrams suggested that the data is close to normal (see Appendix N). After these tests and imputing missing data by using expectation maximisation method, the data sets were ready for further analysis.

6.3 e-Learning systems success: The study from the instructor perspective

This study was designed to gain an understanding of the dimensions of e-Learning systems success from the instructor perspective. Data were collected from instructors of the colleges of education of New Zealand universities. A detailed description of the sample for this survey was given in section 5.3.2.

6.3.1 Data collection and response rate

Data collection was carried out over a two month period in September and October, 2010. An email invitation was first sent to the potential participants together with a web link to access the online survey. Two follow up reminders were used.

The initial email invitation was sent to 775 lecturers. The initial invitation returned 161 usable responses. Of this 161, 41 participants responded that they did not use e-Learning in their papers. After two weeks, the first reminder was sent in the form of an email. An additional 74 usable responses were received after the first reminder. Of this total, 62 responses were usable for further analysis, as 12 participants responded that they did not use e-Learning in their papers. This was followed by the second reminder (sent out two weeks after the first reminder) in which the full package (questionnaire, information sheet, and postage paid return envelope) was mailed to the non-respondents as hard copy. Another 66 responses were returned after the second reminder. Of this, 44 participants responded that they were unable to complete the survey as they had no experience in using online teaching. Out of 327 responses, 26 responses were discarded as they were incomplete (following Tian, Zhang, and Lu, 2003 where responses with more than 20% data missing were considered as incomplete). The response rate (including incomplete responses) was 42.19%; of the responses received, 30.08% were usable after removing incomplete responses and the responses by participants who said that they had no experience in online teaching. Therefore, there were 204 usable responses.

6.3.2 Checking for non-response bias

Non-response bias is the difference between the potential respondents who responded to the survey and those who did not. A low response rate in a study could bias the results of a study and mail surveys have been criticised for their potential in this regard (De Vaus, 2002). Even with high participation rates, study results could suffer from non-response bias when the non-respondent group is distinctly different from the respondents (Kotaniemi, Hassi, Kataja, Jonsson, Laitinen, Anssi, & Lundback, 2001).

If non-response bias exists, the study sample is not representative of the target population and hinders the ability to make generalisations of the study (Hair et al., 2010).The commonly recommended method for guarding against non-response bias is to estimate the effect of non-response (Wayne, 1975). To check that the sample in this study was representative of the larger population, an examination of non-response bias was conducted by comparing early respondents with late respondents (Fleming & Bowden, 2009). Respondents for the initial invitation were compared with the other (late) respondents in terms of demographic items in the questionnaire (Thong, 1996), namely: age, gender, position, and teaching experience.

To identify if there was a significant difference between the groups, a *t*-test was used. There was no significant difference between the early respondents (respondents to the first invitation) and the late respondents (respondents to the reminders) for all variables for which *t*-tests were conducted ($p > .05$). The results of the *t*-test analysis are presented in Table 6.1. The results provided evidence that non-response bias was not a problem.

Table 6.1 Comparison between Early and Late Respondents in the Study from the Instructor Perspective

Construct	*p v*alue
Age	.546
Experience	.116
Position	.324
Gender	.419

6.3.3 Respondent demographics

An analysis of the characteristics of the sample (demographic profile) is presented in this section based on instructor age, gender, academic position, teaching experience, and experience in online teaching. The demographic characteristics of the instructor sample in tabular form are given in Appendix O.

As is evident from Figure 6.1, 140 (71.07%) female and 57 (28.93%) male instructors participated. Thus, females outnumbered males almost three to one. The majority of the respondents (44.39%) were above 55 years of age. The next largest age group was 46-55 years, which accounted for 33.16% of the sample (see Figure 6.2). About 77% of the respondents were 46 years and above.

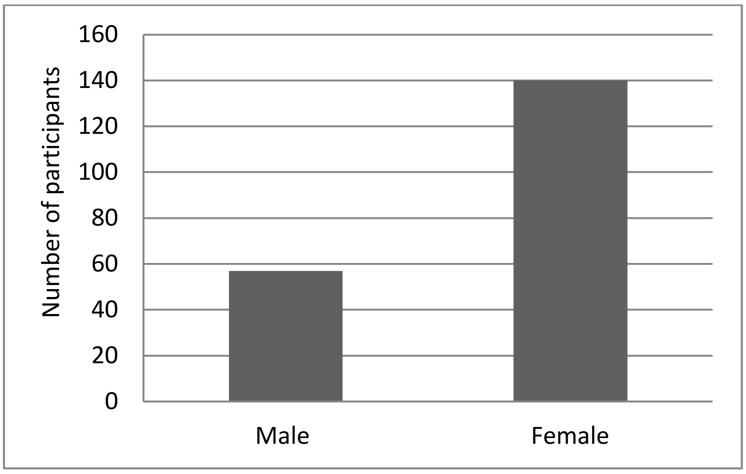


Figure 6.1 Distribution of participants by gender.

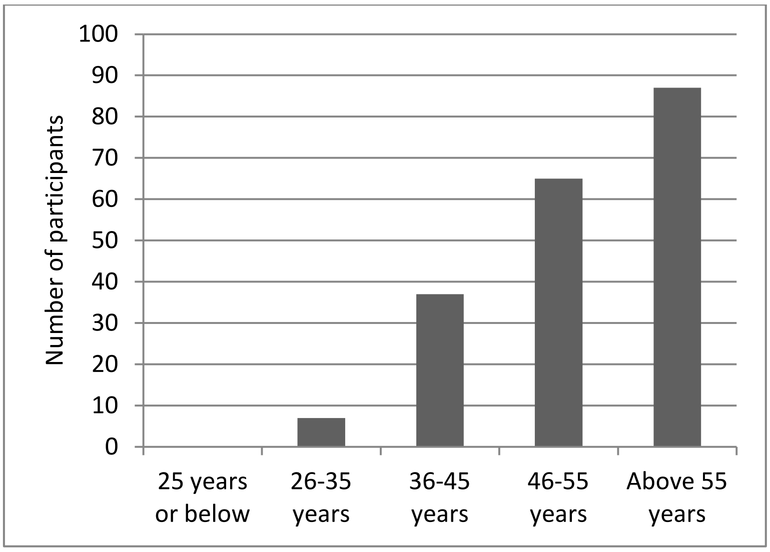


Figure 6.2 Distribution of participants by age.

The majority of the respondents (54.08%) occupied senior lecturer positions; only 2.55% were professors and 6.12% associate professors. Lecturers comprised 28.57% of respondents, and 8.68% were senior tutors. No tutors responded to the survey (see Figure 6.3).

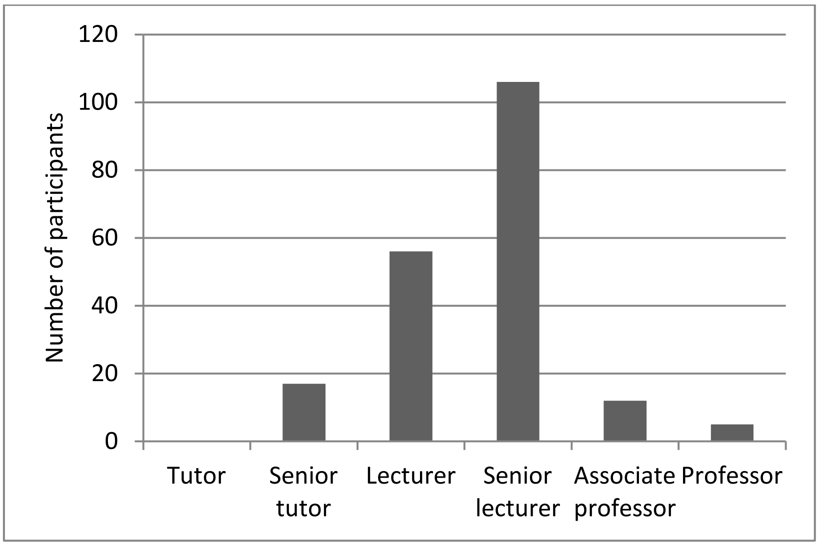


Figure 6.3 Distribution of participants by position.

As far as the teaching experience of the study sample is concerned, the largest group (40.5%) responded that they had more than 25 years of teaching experience, followed by those with 21-25 years (19%), 16-20 years (14.5%), 11-15 years (10%) , 6-10 years (11.5%), 1-5 years (4%). Only one respondent had less than one year of teaching experience (see Figure 6.4).

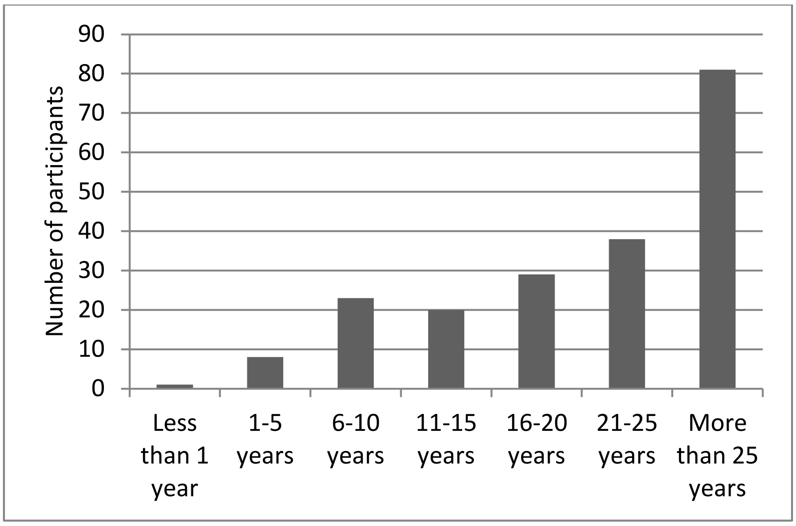


Figure 6.4 Distribution of participants by teaching experience.

With respect to experience in online teaching, the largest group of respondents (47.5%) had 5-10 years of experience, followed by those with 6-10 years (33%), those with 11-15 years (10 %), and those with less than one year's experience (7%). The smallest group (2.5%) comprised those respondents who had been teaching online for more than 15 years (see Figure 6.5). Instructors who had more than 15 years online teaching experience may have started introducing e-Learning in their papers as it emerged and, therefore, were very early adopters.

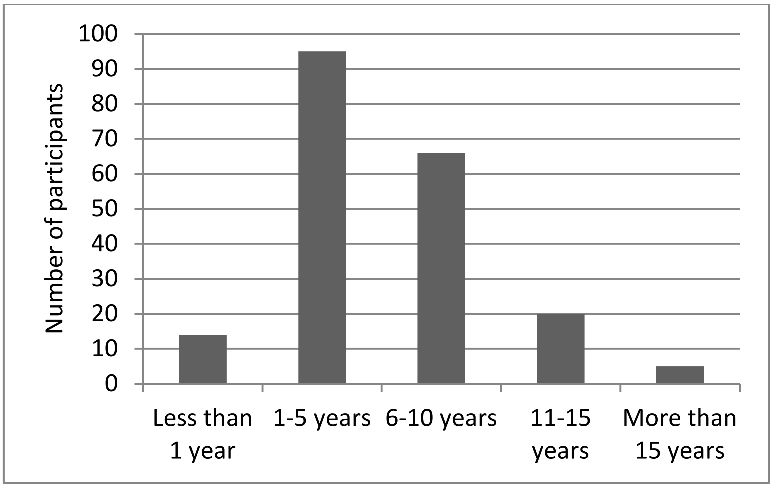


Figure 6.5 Distribution of participants of instructor survey by online teaching experience.

Table 6.2 shows the number of online teaching adopters (67.77%) versus online teaching non adopters (32.23%) out of 301 total respondents to the survey.

Table 6.2 Use and Non-use of Online Teaching by Participants in the Instructor Survey

Use of online teaching	Frequency	Percentage
Yes	204	67.77
No	97	32.23
Total	301	100.00

To summarise the demographic data presented in this section, the respondents were highly experienced as instructors with most of their experience teaching in a traditional (rather than e-Learning based) environment. The respondents were predominantly female.

6.3.4 Testing the measurement model

The data collected from the instructor survey were analysed using PLS with SmartPLS version 2.0 software (Hansmann & Ringle, 2004). The PLS measurement model results for this study are discussed in sections 6.3.4.1 and 6.3.4.2. Then, in section 6.3.4.3, the content validity of the measures is re-assessed by analysing open-ended comments provided by the respondents.

6.3.4.1 Item and internal consistency reliability

The factor loadings should be greater than .5 to indicate reliable items (Hair et al., 2010). As shown in Table 6.3 (in bold), the loadings for the majority of items in this study was greater than .5, indicating acceptable item reliability. Three items (SUI4, SUI5, and SUI6 measuring instructor use of e-Learning system construct) had loadings slightly less than .5 (.47, .47, and .42, respectively) (Refer to section 5.4.1.1 for the full text of these items.) However, the composite reliability and the Cronbach alpha value of instructor use of e-Learning system construct were above the threshold value. Therefore, none of the measurement items were removed from the analysis. All Cronbach alpha values and composite reliability values in this study were greater than .7 (the values range from .76 to .93), noted as satisfactory by Nunnally (1978) (see Table 6.4), indicating acceptable levels of internal consistency reliability.

Table 6.3 Factor Loadings and Cross Loadings for the Measurement Items in the Instructor Survey

Item	CQ	DQ	ISI	ISAT	ISEF	ISS	SQ	SUI
DQ1	.35	**.82**	.36	.32	.30	.37	.43	.24
DQ2	.31	**.77**	.32	.28	.19	.33	.36	.24
DQ3	.41	**.84**	.46	.35	.12	.35	.34	.21
DQ4	.43	**.62**	.40	.33	.27	.41	.39	.25
DQ5	.34	**.77**	.46	.39	.21	.30	.36	.20
SQ1	.32	.42	.31	.44	.35	.42	**.72**	.34
SQ2	.28	.28	.28	.32	.32	.23	**.62**	.32
SQ3	.39	.42	.37	.46	.30	.41	**.73**	.35
SQ4	.37	.38	.37	.47	.30	.29	**.76**	.21
SQ5	.23	.17	.26	.29	.21	.16	**.66**	.09
SQ6	.36	.28	.37	.43	.34	.33	**.70**	.20
SQ7	.38	.30	.25	.49	.38	.30	**.66**	.20
SQ8	.38	.44	.34	.49	.36	.43	**.73**	.36
ISI1	.42	.44	**.76**	.37	.26	.34	.35	.21
ISI2	.34	.39	**.74**	.30	.21	.31	.35	.18
ISI3	.48	.38	**.84**	.42	.38	.40	.34	.21
ISI4	.40	.40	**.77**	.33	.22	.36	.33	.28
ISI5	.46	.52	**.88**	.41	.26	.38	.40	.22
ISI6	.37	.39	**.69**	.30	.15	.27	.33	.14
CQ1	**.69**	.26	.36	.45	.32	.34	.35	.16
CQ2	**.76**	.41	.42	.45	.24	.40	.38	.24
CQ3	**.74**	.35	.36	.39	.24	.41	.28	.33
CQ4	**.71**	.38	.33	.36	.31	.44	.30	.26
CQ5	**.71**	.38	.40	.45	.24	.59	.37	.38
CQ6	**.62**	.29	.34	.38	.38	.39	.37	.13
ISS1	.46	.47	.36	.44	.40	**.82**	.40	.53
ISS2	.38	.44	.33	.38	.26	**.79**	.33	.47
ISS3	.46	.39	.39	.39	.29	**.71**	.33	.41
ISS4	.52	.37	.38	.48	.31	**.75**	.42	.48
ISS5	.49	.26	.22	.37	.26	**.84**	.28	.28
ISS6	.40	.16	.19	.33	.27	**.70**	.26	.34
ISS7	.26	.25	.27	.47	.53	**.57**	.35	.21
ISS8	.52	.30	.36	.34	.28	**.78**	.35	.43
ISAT1	.55	.43	.48	**.94**	.54	.58	.63	.40
ISAT2	.56	.44	.40	**.95**	.53	.56	.56	.44
ISAT3	.51	.35	.37	**.88**	.58	.40	.47	.36
ISEF1	.34	.27	.27	.52	**.89**	.41	.36	.37
ISEF2	.36	.22	.25	.47	**.90**	.39	.40	.35
ISEF3	.31	.17	.22	.43	**.85**	.33	.33	.21
ISEF4	.42	.35	.35	.61	**.87**	.49	.47	.41
ISEF5	.33	.22	.28	.55	**.90**	.41	.42	.29
SUI1	.24	.20	.18	.33	.41	.36	.32	**.68**
SUI2	.32	.12	.17	.22	.36	.28	.28	**.72**
SUI3	.22	.13	.20	.27	.16	.29	.20	**.64**
SUI4	.22	.08	.10	.29	.39	.16	.28	**.47**
SUI5	.16	.24	.16	.27	.23	.24	.13	**.47**
SUI6	.13	.11	.13	.24	.32	.09	.21	**.42**
SUI7	.27	.26	.17	.35	.20	.47	.28	**.72**
SUI8	.25	.28	.22	.35	.22	.56	.33	**.73**

Note: CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.

Table 6.4 Internal Consistency Reliability and Convergent Validity of Measures Used in the Study from the Instructor Perspective

Construct	No of items	Composite reliability	Cronbach alpha	AVE
Quality of the e-Learning development and implementation process	5	.88	.82	.59
Quality of the institutional support to instructors	6	.90	.87	.61
Quality of the e-Learning system	8	.87	.84	.53
Instructor use of the e-Learning system	8	.82	.76	.45
Instructor satisfaction	3	.94	.91	.85
Instructor self-efficacy	5	.95	.93	.78
Quality of the e-Learning content	6	.86	.80	.50
Quality of the instructor support to learners	8	.90	.87	.53

6.3.4.2 Convergent and discriminant validity

Item reliability and internal consistency reliability checks presented in section 6.3.4.1 can be also seen as assessing convergent validity (as discussed in section 5.6.2.4). Item reliability and internal consistency reliability were also an evidence or construct validity.

As discussed in section 5.6.2.4, AVE values can also be used as evidence of convergent validity. AVE values greater than .5 indicate acceptable levels of convergent validity (Hair et al., 2010). Table 6.4 shows that all constructs except for instructor use of the e-Learning system construct (with AVE value of .45) and quality of the e-Learning content construct (with AVE value .5) had AVE values greater than .5. However, AVE of these two constructs was very much close to .5, and I judged the construct validity to be acceptable.

Table 6.5 reports the discriminant validity results of the measurement model for the study from the instructor perspective. The square roots of AVE values (diagonal elements) were higher than correlation values in the off-diagonal elements of corresponding rows and columns. Moreover, as shown in Table 6.3, all items loaded higher on their own construct than on other constructs in the model. Therefore, the AVE and the item cross loadings fulfilled the requirements of discriminant validity.

Thus, the measures used in the model passed all reliability and consistency checks introduced in section 5.6.2. The psychometric properties of the measurement model were found to be satisfactory, justifying further analysis of the research model.

Table 6.5 Discriminant Validity Results for the Instructor Survey

Construct	CQ	DQ	ISI	ISAT	ISEF	ISS	SQ	SUI
CQ	.71							
DQ	.51	.77						
ISI	.55	.56	.78					
ISAT	.60	.47	.47	.92				
ISEF	.40	.28	.28	.59	.88			
ISS	.62	.49	.46	.58	.48	.73		
SQ	.55	.50	.41	.67	.46	.49	.73	
SUI	.41	.30	.27	.44	.45	.54	.48	.68

Note. Square roots of AVE are shown on the diagonal; off-diagonal cells show correlations between constructs. CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development & implementation process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.

6.3.4.3 Revisiting content validity

In the present study, content validity of construct measures was assured by reusing validated measures whenever possible (see section 5.4.1) and by conducting a content validity study with experts (see section 5.4.3). In addition, for each construct in the instructor survey, at the end of corresponding section of the questionnaire (see Appendix B), the respondents were prompted to comment on the content of the construct, as suggested by the items included in the questionnaire. It was expected that free-form comments by the respondents would reflect any problems in interpreting the items and would through additional light on how items were interpreted by the respondents.

No problems were detected, as there were no complaints about particular items and the respondents appeared to interpret the items as expected. The constructs most commonly commented on were quality of the e-Learning development and implementation process, institutional support to instructors, and quality of the e-Learning system.

For quality of the e-Learning development and implementation process, respondents' comments suggested the items were interpreted as intended. In particular, the respondents interpreted the term programme in the items as an organisation-wide programme initiated to improve e-Learning practice, rather than as a computer program used for e-Learning. Some of the comments supporting this interpretation are "No evaluation of effectiveness of courses apart from three yearly student evaluation", "I have never been consulted on the e-Learning environment at this institution", and "From my observations and experience insufficient institutional time and resourcing is allocated to ensure all of the above are effective".

Free form comments suggested that the participants interpreted the items of institutional support to instructors as relating to institutional support in using e-Learning (not as any other kind of institutional support), and both technology and pedagogical aspect were covered. Some of the comments supporting this interpretation are "We have a very active and approachable team to support us in e-Learning activities", "Still too focused on technological issues. Pedagogy should rule", and "We have excellent technicians available to assist us in classrooms but assistance is not there at course design level as far as I know".

Respondent comments regarding quality of the e-Learning system suggested that a range of systems have been used (some of them, developed in-house and therefore unique). Comments suggested that the respondents used different types of learning management systems and that the respondents were not technology savvy and were not aware on e-Learning technologies that go beyond the functionality commonly found in learning management systems ("I stress that it is often the instructor who is still the learner-developing more effective skills as we become confident" and "Our system has many more capabilities than are currently used by the majority of lecturers"). None of the respondents indicated confusion regarding how the term e-Learning system should be interpreted.

6.3.5 Testing the structural model

The structural model testing results are presented in Figure 6.6. Figure 6.6 shows the amount of variance explained by the model (R^2), path coefficients, which explain the strength of the relationships between constructs, and the relevant *t*-test results, which determine the level of significance of relationships. The R^2 values (variance explained) for each of the variables are given in Table 6.6 and in Figure 6.6. The model explained 39% of the variance in quality of the e-Learning content, 44% of the variance in quality of the instructor support to learners, 48% of the variance in instructor satisfaction with e-Learning, and 30% of the variance in instructor use of the e-Learning system. All R^2 values were above 10%, the threshold value suggested by Falk and Miller (1992), indicating that the model has a substantive explanatory power.

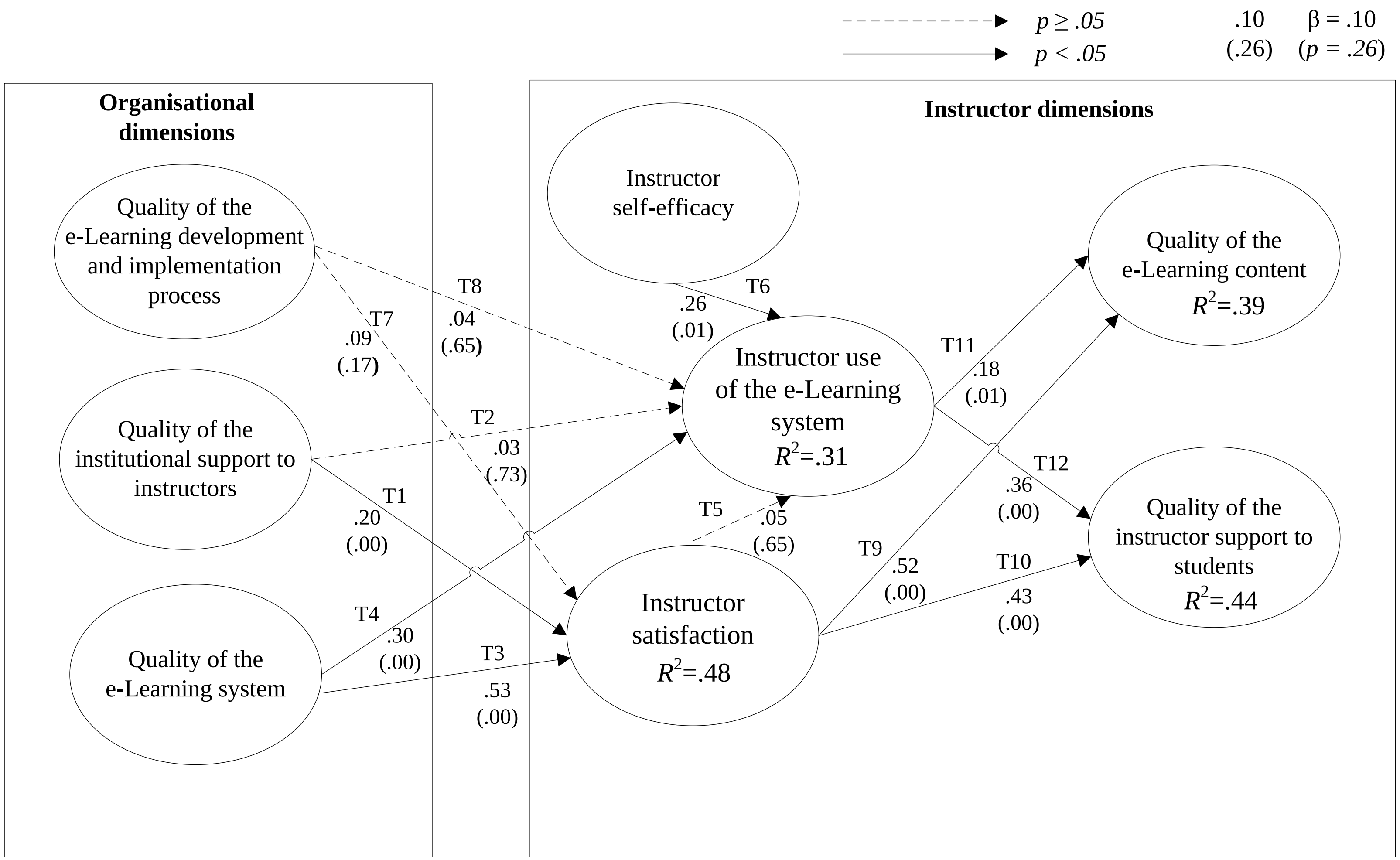


Figure 6.6 Model testing results for the study from the instructor perspective.

Table 6.6 Variability Explained ($\boldsymbol{R^2}$) for Dependent Variables in the Model from the Instructor Perspective

Construct	R^2
Quality of the e-Learning content	.39
Quality of the instructor support to learners	.44
Instructor satisfaction	.48
Instructor use of the e-Learning system	.31

The following subsections present the results for individual hypotheses introduced in section 3.4. Each subsection starts with a table presenting the value of the path coefficient (β) and the level of significance (p value). Based on t-test analysis of the bootstrap samples (using SmartPLS functionality), hypotheses were categorised as either supported or not supported with p = .05 used as the threshold for statistical significance. Eight out of 12 hypotheses in the model from the instructor perspective were supported. Following Kline (2011), in the discussion of the outcomes of hypotheses testing, paths with β less than .1 were considered to correspond to small effects, paths with β around .3 were considered to correspond to medium effects, and paths with β greater than .5 were considered to correspond to large effects.

6.3.5.1 The higher the quality of the institutional support to instructors, the higher the level of instructor satisfaction

Table 6.7 The Higher the Quality of Institutional Support to Instructors, the Higher the Level of Instructor Satisfaction

Hypothesis	Description	Path coefficient	p value	Conclusion
T1	The higher the quality of the institutional support to instructors, the higher the level of instructor satisfaction	.20	$p < .001$	Supported

As shown in Table 6.7, the quality of the institutional support to instructors affected instructor satisfaction ($p < .001$) with a relatively small effect size. This indicates that when the quality of institutional support to instructors in using the e-Learning system is high, it is likely to result in greater instructor satisfaction of the e-Learning system.

The finding is consistent with previous IS success research and e-Learning systems success research (Samarawikrema & Stacey, 2007; Landrum & Prybutok, 2004). Samarawikrema and Stacey studied the adoption of web-based learning and teaching. They used a case study approach, so that the effect size in their study cannot be characterised using statistics. Landrum and Prybutok studied library information system success and found a similar relationship (between user satisfaction and service quality in a library system), with a medium effect size.

6.3.5.2 The higher the quality of the institutional support to instructors, the greater the extent of instructor use of the e-Learning system

Table 6.8 The Higher the Quality of the Institutional Support to Instructors, the Greater the Extent of Instructor Use of the e-Learning System

Hypothesis	Description	Path coefficient	*p* value	Conclusion
T2	The higher the quality of the institutional support to instructors, the greater the extent of instructor use of the e-Learning system	.03	.73	Not supported

As shown in Table 6.8, the effect of quality of the institutional support to instructors on the extent of instructor use of the e-Learning system was not statistically significant ($p = .73$). The finding contradicted some of the previous IS research (Mahmood et al., 2001). Mahmood et al.'s finding was based on a meta-analysis study of empirical literature to identify the determinants of information technology usage in business. Thus, this study setting was different from the studies reviewed by Mahmood et al.

The discrepancy may be due to instructors in university settings having more discretion in using e-Learning that business users in using business IS. This makes them less dependent on external support, as instructors who have trouble using certain e-Learning features may just avoid using them. On the other hand, enthusiasts are likely to be motivated to solve any problems by themselves.

6.3.5.3 The higher the quality of the e-Learning system, the higher the level of instructor satisfaction

Table 6.9 The Higher the Quality of the e-Learning System, the Higher the Level of Instructor Satisfaction

Hypothesis	Description	Path coefficient	p value	Conclusion
T3	The higher the quality of the e-Learning system, the higher the level of instructor satisfaction	.53	$p < .001$	Supported

As shown in Table 6.9, quality of the e-Learning system affected the level of instructor satisfaction ($p < .001$) with a large effect size. This indicates that when quality of the e-Learning system is high, the instructors are more likely to be satisfied by the system.

This relationship is consistent with previous research on e-Learning systems success (Chiu, Chiu, et al., 2007; Roca et al., 2006). Chiu, Chiu, et al. found a similar relationship (between quality of e-learning system and user satisfaction with students as users) with a relatively small effect size, and Roca et al. found a similar relationship with a medium effect size.

6.3.5.4 *The higher the quality of the e-Learning system, the greater the extent of instructor* **use of the e-Learning system**

Table 6.10 The Higher the Quality of the e-Learning System, the Greater the Extent of Instructor Use of the e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
T4	The higher the quality of the e-Learning system, the greater the extent of instructor use of the e-Learning system	.30	$p < .001$	Supported

As shown in Table 6.10, quality of the e-Learning system affected instructor use of the system ($p < .001$) with a medium effect size. In agreement with DeLone and McLean's (2003) IS success model, the results indicate that when quality of the e-Learning system is high, the instructors are likely to use a broader range of functionalities in the system.

The finding is consistent with previous IS success research (DeLone & McLean, 2003; Rai et al., 2002), as well as e-Learning systems success research with students (Holsapple & LeePost, 2006; Menchaca & Bekele, 2008). Rai et al. found a positive relationship between these two constructs with a weak effect size in a study to validate the IS success model (DeLone & McLean, 1992) in the context of faculty staff and administrators of a university using a university information system (that did not include e-Learning functionality). Although Holsapple and LeePost, and Menchaca and Bekele studied this relationship in an e-Learning systems success context, they did not provide effect sizes as Holsapple and LeePost did not validate the model, and Menchaca and Bekele used the case study method.

6.3.5.5 *The higher the level of instructor satisfaction, the greater the extent of instructor use of the e-Learning system*

Table 6.11 The Higher the Level of Instructor Satisfaction, the Greater the Extent of Instructor Use of the e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
T5	The higher the level of instructor satisfaction, the greater the extent of instructor use of the e-Learning system	.05	.65	Not supported

The effect of instructor satisfaction on extent of instructor use of the e-Learning system was not statistically significant ($p = .65$) (see Table 6.11). The finding is consistent with a view that the level of instructor satisfaction does not affect the extent of instructor use of the e-Learning system.

This finding is not consistent with the findings of some of the previous IS research (Baroudi et al., 1986; Karahanna et al., 1999). Baroudi et al. studied the effect of user involvement on system usage and user satisfaction in a study involving manufacturing firms in the USA. They found that user satisfaction affected system usage with a medium effect size. Karahanna et al. studied information technology adoption behaviour of employees and found a similar relationship with a medium effect size.

Nonetheless, in the e-Learning context, where Chen (2012) studied the relationship between e-Learning system use by new employees and job adaptation, it was found that user satisfaction did not affected system use with a group of employees who had e-Learning experience.

6.3.5.6 *The higher the level of instructor self-efficacy, the greater the extent of instructor use of the e-Learning system*

Table 6.12 The Higher the Level of Instructor Self-efficacy, the Greater the Extent of Instructor Use of the e-Learning System

Hypothesis	Description	Path coefficient	*p* value	Conclusion
T6	The higher the level of instructor self-efficacy, the greater the extent of instructor use of the e-Learning system	.26	.01	Supported

As shown in Table 6.12, instructor self-efficacy affected the extent of instructor use of the e-Learning system ($p = .01$) with a medium effect size. This indicates that when instructors have confidence in using the e-Learning system, they are likely to use a broader range of functionalities in the system.

The finding is consistent with previous e-Learning research (Chen, 2010; Zhao, 2007). Chen found a similar relationship between these two constructs with a relatively large effect size in a study with pre-service university teachers to examine the teacher use of technology. Zhao found similar results in a study examining teacher perspectives of technology integration with school teachers, using a qualitative method involving document analysis, interviews, and observations. Wang and Wang (2009) studied instructor adoption of an e-Learning systems by using a model based on the TAM (Davis, 1989) and incorporating a number of constructs of the IS success model (DeLone & McLean, 2003). According to their finding, self-efficacy did not affect intention to use e-Learning system.

6.3.5.7 The higher the quality of the e-Learning development and implementation process, the higher the level of instructor satisfaction

Table 6.13 The Higher the Quality of the e-Learning Development and Implementation Process, the Higher the Level of Instructor Satisfaction

Hypothesis	Description	Path coefficient	*p* value	Conclusion
T7	The higher the quality of the e-Learning development and implementation process, the higher the level of instructor satisfaction	.09	.17	Not supported

As shown in Table 6.13, the hypothesised relationship between quality of the e-Learning development and implementation process and instructor satisfaction was not statistically significant ($p = .17$). The finding did not support Samarawikrema and Stacey's (2007) conclusion that there is a relationship between quality of e-Learning implementation and the level of instructor satisfaction. They based this on a qualitative case study at a multi-campus urban Australian university.

The respondents in this survey were university lecturers and, therefore, they had considerable knowledge about the importance of using e-Learning systems in their teaching and experience in using computers and the internet in their teaching and day-to-day life. The instructors' perceptions of the e-Learning environment, their general attitude about the computers and the web, and their previous experience are foremost variables that influence the actual use of e-Learning environments (Mahdizadeh et al., 2008). The substantial part of what instructors feel about e-Learning is driven by individual experiences about the e-Learning system (Mahdizadeh et al., 2008), and, therefore, the quality of the organisation-level e-Learning development and implementation may not influence instructor satisfaction directly.

It should be noted, though, that the *p* value was rather low ($p = .17$), so it would not be surprising if in a study with greater statistical power (e.g., with a larger number of participants), this relationship was found to be statistically significant. However, the low value of the path coefficient in this study ($\beta = .09$) suggests that even if the relationship was found to be statistically significant in a study with greater statistical power, it is likely that the effect size would be small. Statistically significant effects with low effect size are not interesting as they have little predictive value and are likely to be spurious (Chin, 1998).

6.3.5.8 The higher the quality of the e-Learning development and implementation process, the greater the extent of instructor use of the e-Learning system

Table 6.14 The Higher the Quality of the e-Learning Development and Implementation Process, the Greater the Extent of Instructor Use of the e-Learning System

Hypothesis	Description	Path coefficient	*p* value	Conclusion
T8	The higher the quality of the e-Learning development and implementation process, the greater the extent of instructor use of e-Learning system	.04	.65	Not supported

As shown in Table 6.14, the effect of quality of the e-Learning development and implementation process on the extent of instructor use of the e-Learning system was not statistically significant ($p = .65$). The finding contradicted the suggestion by Howell et al. (2004) who conducted a review of literature and suggested quality of the e-Learning development and implementation as a dimension affecting instructor use of e-Learning.

Similar to the discussion on quality of the e-Learning development and implementation process and instructor satisfaction relationship (see section 6.3.5.8), the possible justification for this finding is that the extent of instructor use of the e-Learning system is mostly an individual decision, based on their perceptions of whether it is useful or not. However, it is worth conducting longitudinal studies to gain more understanding about this relationship.

6.3.5.9 *The higher the level of instructor satisfaction, the higher the quality of the content provided via e-Learning system*

Table 6.15 The Higher the Level of Instructor Satisfaction, the Higher the Quality of Content Provided via e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
T9	The higher the level of instructor satisfaction, the higher the quality of the content provided via e-Learning system	.52	$p < .001$	Supported

As shown in Table 6.15, instructor satisfaction affected quality of the e-Learning content provided to learners via e-Learning system ($p < .001$) with a large effect size. This indicates that when instructors are satisfied with the e-Learning system, they are more likely to provide high quality content to the learners.

Interpreting the content quality as an aspect of individual impact in DeLone and McLean's IS success model (2003), this finding can be seen as consistent with the previous e-Learning success studies (Lee & Lee, 2008; Lin, 2007). Lee and Lee found that learner satisfaction affected individual impact measured in terms of academic performance, with a medium effect size. Lin found a similar relationship, where individual impact was measured in terms of e-Learning system use, also with a medium effect size.

6.3.5.10 *The higher the level of instructor satisfaction, the higher the quality of the instructor support provided to learners via e-Learning system*

Table 6.16 The Higher the Level of Instructor Satisfaction, the Higher the Quality of the Instructor Support Provided to Learners via e-Learning system

Hypothesis	Description	Path coefficient	p value	Conclusion
T10	The higher the level of instructor satisfaction, the higher the quality of the instructor support to learners via e-Learning system	.43	$p < .001$	Supported

As shown in Table 6.16, instructor satisfaction affected quality of the instructor support to learners provided via e-Learning system ($p < .001$) with a medium effect size. This indicates that when instructors are satisfied with the e-Learning system, they are more likely to provide high quality support to learners via the e-Learning system.

Interpreting instructor support to learners as an aspect of individual impact in DeLone and McLean's IS success model (2003), this finding can be seen as consistent with previous e-Learning success research (Lee & Lee, 2008; Lin, 2007) where they found that learner satisfaction affected individual impact, as discussed in section 6.3.5.10.

6.3.5.11 The greater the extent of instructor use of the e-Learning system, the higher the quality of the content provided via e-Learning system

Table 6.17 The Greater the Extent of Instructor Use of the e-Learning System, the Higher the Quality of the Content Provided via e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
T11	The greater the extent of instructor use of the e-Learning system, the higher the quality of the content provided via e-Learning system	.18	.01	Supported

As shown in Table 6.17, the extent of instructor use of the e-Learning system affected quality of the content provided via e-Learning system ($p = .01$) with a small effect size. This indicates that when the instructors use a broader set of functionalities of the e-Learning system, they are more likely to provide high quality content to the learners.

Interpreting quality of the e-learning content as an aspect of individual impact in DeLone and McLean's IS success model (2003), this finding can be seen as consistent with the Holsapple and LeePost (2006) study. They studied e-Learning systems success using the DeLone and McLean’s IS success model. In their study, e-Learning system use was demonstrated to have a positive effect on individual impact.

6.3.5.12 The greater the extent of instructor use of the e-Learning system, the higher the quality of the instructor support to learners via e-Learning system

Table 6.18 The Greater the Extent of Instructor Use of the e-Learning System, the Higher the Quality of the Instructor Support to Learners via e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
T12	The greater the extent of instructor use of the e-Learning system, the higher the quality of the instructor support to learners via e-Learning system	.36	$p < .001$	Supported

As shown in Table 6.18, the extent of instructor use of the e-Learning system affected quality of the instructor support to learners ($p < .001$) with a medium effect size. This indicates that when instructors use a broader set of functionalities of the e-Learning system, they are more likely to provide high quality support to learners via the e-Learning system. Interpreting quality of instructor support to learners as an aspect of individual impact in DeLone and McLean's IS success model (2003), this finding can be seen as consistent with the results of Holsapple and LeePost (2006), as discussed in section 6.3.5.11.

6.3.6 Indirect effects in the structural model

Indirect effects were considered by comparing total effects to direct effects (see Table 6.19. The rest of this section discusses the indirect effects discovered. The strength of an indirect effect is judged by the total effect when there is no direct effect or by the difference between the total and the direct effect when both effects were statistically significant. As differences between total and direct effects were too small to correspond to meaningful indirect effects, they are not discussed.

Table 6.19 Direct and Total Effects of Constructs in the Study from the Instructor Perspective

	Effect on instructor satisfaction		Effect on instructor use of the e-Learning system		Effect on quality of the instructor support to learners		Effect on quality of the e-Learning content	
	Direct effect	Total effect	Direct effect	Total effect	Direct effect	Total effect	Direct effect	Total effect
Quality of e-Learning development and implementation process	—	—	—	—				
Quality of institutional support to instructors	.20	.20	—	—		.10		.11
Quality of e-Learning system	.53	.53	.30	.33		.34		.34
Instructor satisfaction					.43	.45	.52	.53
Instructor use of e-Learning system					.36	.36	.18	.18
Instructor self-efficacy			.26	.26		—		—

Note: Cells containing a dash (—) indicate lack of statistical significance ($p \geq 0.05$). Cells corresponding to pairs of constructs not connected by directed paths in the model (see Figure 6.6) were left empty.

Quality of the institutional support to instructors had an indirect effect, with a small effect size, on quality of the e-Learning content and on quality of the instructor support to learners. Quality of the e-Learning system had an indirect effect, with medium effect size, on quality of the e-Learning content and quality of the instructor support to learners. As seen in Table 6.19, quality of the e-Learning system was the most influential of organisational dimensions, with a large effect on instructor satisfaction and a number of medium indirect effects.

Thus, according to the results, quality of the instructor support to learners through the e-Learning system and quality of the content provided by an instructor to learners can be improved via improving instructor satisfaction as well as through encouraging instructor use of the system by improving instructor confidence. This can happen by improving the quality of the e-Learning systems, and, to a smaller extent, by providing better support to instructors.

6.3.7 Post hoc analyses

6.3.7.1 Measuring instructor use of the e-Learning system using formative indicators

Constructs in a model can be modelled either as reflective or formative (Chin, 1998). If the direction of causality is from constructs to indicators it should be modelled as reflective and if the direction of causality is from indicators to constructs it should be modelled as formative (Jarvis, MacKenzie, & Podsakoff, 2003, p. 201). In formative models, indicators may represent unrelated aspects of the construct they measure (Al-Busaidi, Olfman, Ryan, & Leroy, 2010); therefore, unlike reflective indicators, formative indicators are not expected to change in concert, and item reliability, internal consistency reliability, and convergent validity criteria are not applicable to formative indicators.

In the main analysis for the instructor model (see section 6.3.4), I treated all indicators as reflective. In particular, instructor use of the e-Learning system was measured using eight items, and these items were treated as reflective indicators, similar to the study where they were introduced (Wang & Wang, 2009). Thus, in the main analysis I took a view that instructor use of the e-Learning system corresponds to the overall level of sophistication of how the instructor uses the system, which results in the instructor using various functionalities of the systems (listed in the items). Relatively low item loadings for some of the items of instructor use of the e-Learning system obtained in the main analysis contradicted this view (SUI4 loaded at.47, SUI5 loaded at .47, and SUI6 loaded at .42, see Table 6.3).

However, some other studies considered similar indicators (indicators corresponding to the extent to which different features of an information system are used) as formative (for example, Brock & Zhou, 2005; Larsen, A. M. Sorebo, & O. Sorebo, 2009). Treating the indicators of instructor use of the e-Learning system as formative corresponds to a view that when the instructor uses different functionalities, it contributes to the construct, but there is no expectation that the uses of different functionalities would correlate or that all items load high on the construct. In particular, extensive use of one function does not result in the use of other functionalities (Larsen et al., 2009).

To address the measurement problem issue associated with some of the items of instructor use of the e-Learning system having low item loadings, I reanalysed the model from the instructor perspective treating the indicators of instructor use of the e-Learning system construct as formative. The updated model was tested by following the same steps as in the main analysis (see section 6.3.4).

First, the measurement model was tested following the same procedure and applying the same criteria as in the main analysis (see section 6.3.4). (Because the indicators of instructor use of the e-Learning system construct were treated as formative indicators, item reliability, internal consistency reliability, and convergent validity for instructor use of the e-Learning system construct were not assessed.) No item reliability or internal consistency reliability issues were discovered: all factor loading values were above .5, and internal consistency reliability values for constructs modelled with reflective indicators were above .7 (see Table P1 in Appendix P for item loadings and cross loadings and see Table P2 in Appendix P for composite reliability, Cronbach alpha, and AVE values). Moreover, the criteria for convergent and discriminant validity were also met: AVE values for constructs modelled with reflective indicators were above .5, and correlations between constructs were below the corresponding square roots of AVE (see Table P3 in Appendix P for square roots of AVE and correlations between constructs).

Second, the structural model was tested. Similar to structural model analysis in the main analysis (see section 6.3.5), p values were estimated based on bootstrapping with 500 samples. As shown in Table 6.20, the post hoc analysis results were similar to the results of the main analysis: the outcomes of hypotheses testing for individual hypotheses were the same, and the effect sizes were very similar.

Table 6.20 Measuring Instructor Use of the e-Learning System using Formative Indicators

Relationship	Post hoc analysis (with formative indicators for instructor use of the e-Learning system)		Main analysis (reported in section 6.3.5)	
	Path coefficient	*p* value	Path coefficient	*p* value
Quality of implementation → System use	.05	.62	.04	.65
Quality of implementation → Instructor satisfaction	.09	.19	.09	.17
Institutional support → System use	.03	.77	.03	.73
Institutional support → Instructor satisfaction	.20	.01	.20	<0.001
System quality → System use	.33	<0.001	.30	<0.001
System quality → Instructor satisfaction	.53	<0.001	.53	<0.001
Instructor satisfaction → System use	.03	.81	.05	.65
Instructor self-efficacy → System use	.25	.05	.26	.01
System use → Content quality	.18	.02	.18	.01
System use → Instructor support	.38	<0.001	.36	<0.001
Instructor satisfaction → Content quality	.53	<0.001	.52	<0.001
Instructor satisfaction → Instructor support	.41	<0.001	.43	<0.001

6.3.7.2 Effects of quality of e-Learning development and implementation process on e-Learning system quality and quality of institutional support to instructors

The results of the main analysis (presented in section 6.3.5) suggested that quality of e-Learning development and implementation process has no effects. Nevertheless, the measure of quality of e-Learning development and implementation process used in the present study passed content (see section 5.4.3) and discriminant and convergent (see section 6.3.4) validity checks; therefore, it was not likely that no effects were found because of problems with the measure.

Moreover, the study covered a range of institutions, and it was likely that there were considerable variations in the quality of e-Learning development and implementation process from institution to institution. For ethical reasons and to maximize the response rate the survey was designed to ensure that quantitative comparisons between organisations were not possible; nonetheless, free-form comments from the respondents suggested that variation existed. Therefore, it was not likely that no effects of quality of e-Learning development and implementation process were found because there was no variation in quality of e-Learning development and implementation process in the data set.

Based on these considerations, I reconsidered the research model. In the main analysis quality of e-Learning development and implementation process was found to correlate relatively highly with quality of the institutional support to instructors (Pierson correlation *r*=.56, see Table 6.5) and quality of the e-Learning system (*r*=.50). The content of the quality of e-Learning development and implementation process construct emphasised getting feedback on the effectiveness of the overall e-Learning programme (see the list of items in Table 5.3). The nature of the feedback thus obtained could be assessed by considering free-form comments supplied from the respondents, which emphasised quality of the e-Learning system and institutional support to instructors (see the discussion of qualitative results in section 6.3.8). It was likely that the management would act on such comments to improve quality of e-Learning system and quality of institutional support to instructors, suggesting that higher quality of e-Learning development and implementation process should result in higher quality of institutional support to instructors and higher quality of the e-Learning system.

Samarawikrema and Stacey (2007), based on a case study research conducted at a university in Australia, asserted that strong evaluation and assessment policies (established as part of the organisation wide e-Learning development and implementation process) result in better institutional support to instructors, that ultimately contributes to e-Learning systems success. Moreover there is a broad support in the literature that holistic evaluation of consequences of information systems implementation provides top management with inputs that are used to improve information systems quality (Berghout, 2012).

Based on the above justification, the following hypotheses were added to the model:

T13: The higher the quality of the e-Learning development and implementation process, the higher the quality of institutional support to instructors

T14: The higher the quality of the e-Learning development and implementation process, the higher the quality of the e-Learning system

The updated model was tested by following the same steps as in the main analysis (see section 6.3.4).

First, the measurement model was tested following the same procedure and applying the same criteria as in the main analysis (see section 6.3.4). (As in the model analysed in section 6.3.7.1, the indicators of instructor use of the e-Learning system construct were treated as formative and the indicators for the rest of the constructs—as reflective). No item reliability or internal consistency reliability issues were discovered: all factor loading values were above .5, and internal consistency reliability values for constructs modelled with reflective indicators were above .7 (see Table Q1 in Appendix Q for item loadings and cross loadings and see Table Q2 in Appendix Q for composite reliability, Cronbach alpha, and AVE values). Moreover, the criteria for convergent and discriminant validity were also met: AVE values for constructs modelled with reflective indicators were above .5, and correlations between constructs were below the corresponding square roots of AVE (see Table Q3 in Appendix Q for square roots of AVE and correlations between constructs).

Second, the structural model was tested. Similar to structural model analysis in the main analysis (see section 6.3.5), p values were estimated based on bootstrapping with 500 samples. As shown in Table 6.21, quality of e-Learning development and implementation process affected quality of the institutional support to instructors ($p < .001$), and quality of the e-learning system ($p < .001$) with large effect sizes. This suggests that when an institution maintain better e-Learning development and implementation process by conducting evaluation and assessment, it is more likely to provide high quality institutional support to instructors in relation to e-learning and to maintain high quality e-Learning systems.

Table 6.21 The structural model modified to include the direct effects of quality of the e-Learning development and implementation process on quality of institutional support to instructors and quality of the e-Learning system: results of model testing

Relationship	Post hoc analysis (with T13 and T14 added to the structural model)		Main analysis (reported in section 6.3.5)	
	Path coefficient	*p* value	Path coefficient	*p* value
Quality of implementation → Institutional support to instructors	.56	< 0.001		
Quality of implementation → System quality	.50	< 0.001		
Quality of implementation → System use	.05	.67	.04	.65
Quality of implementation → Instructor satisfaction	.09	.19	.09	.17
Institutional support to instructors→ System use	.03	.77	.03	.73
Institutional support to instructors→ Instructor satisfaction	.20	.01	.20	<0.001
System quality → System use	.33	<0.001	.30	<0.001
System quality → Instructor satisfaction	.53	<0.001	.53	<0.001
Instructor satisfaction → System use	.04	.80	.05	.65
Instructor self-efficacy → System use	.25	.05	.26	.01
System use → Content quality	.18	.03	.18	.01
System use → Instructor support	.39	<0.001	.36	<0.001
Instructor satisfaction → Content quality	.53	<0.001	.52	<0.001
Instructor satisfaction → Instructor support	,42	<0.001	.43	<0.001

Note. Cells corresponding to pairs of constructs not connected by directed paths in the model were left empty.

As shown in Table 6. 22 the quality of e-Learning development and implementation process had a large indirect effect on instructor satisfaction, medium indirect effect on quality of the content and quality of the instructor support to learners, and a medium indirect effect on e-Learning system use by the instructor.

The results of the post hoc analysis reported in this section justify organisational investment in maintaining high quality e-Learning development and implementation process (and in evaluation and assessment of the e-Learning program in particular).

Once the direct effects of the quality of the process on system quality and on institutional support to instructors were considered it became clear that the quality e-Learning development and implementation process clearly affects other dimensions of e-Learning systems success, including (indirectly) the important dimensions of quality of instructor support to learners and quality of e-Learning content provided by instructors to learners.

Table 6.22 Direct and Total Effects of Quality of e-Learning Development and Implementation Process

Construct	Effect on institutional support to instructors		Effect on quality of the e-Learning system		Effect on instructor satisfaction		Effect on instructor use of the e-Learning system		Effect on quality of the instructor support to learners		Effect on quality of the e-Learning content	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Post hoc analysis (with T13 and T14 added to the structural model)	.56	.56	.50	.50	—	.47	—	.24		.29		.29
Main analysis (reported in section 6.3.5)					—	—	—	—				

Note. Cells containing a dash (—) indicate lack of statistical significance ($p \geq 0.05$). Cells corresponding to pairs of constructs not connected by directed paths in the model were left empty.

6.3.8 Findings of the qualitative analysis

The results from the quantitative analysis of survey data were enriched by analysis of answers to the open ended questions in the survey instrument and are presented in this section. The questionnaire is described in section 5.4.1.2. As explained in section 5.7, the constant comparative method was used to analyse the qualitative data. Qualitative data provided insights into the nature of the success dimensions and of the relationships between them and offered a view of various facets of e-Learning systems success as seen by the instructors.

Where direct quotations are given in the following section, the following notation is used to represent the characteristics of a respondent: F or M for female or male, A followed by the number of years for age, TE followed by the number of years of teaching experience, eLE followed for the number of years of online teaching experience, PS for senior academic position (associate professor or full professor), PM for mid-range academic position (Senior Tutor, Lecturer, or Senior Lecturer). The following format was used, with fields always given in the same order: (Pseudonym, Gender, Age, Teaching experience, Experience with online teaching, Position). Thus, (Jane, F, A36-45, TE21-25, eLE1-5, PM) represented a female with pseudonym (assigned for the purpose of this presentation) Jane, 36 to 45 years old, with 21 to 25 teaching experience and with one to five years of experience teaching in an e-Learning environment, and employed at a mid-range position (Senior Tutor, Lecturer, or Senior Lecturer). More detailed information (such as the exact position) was often available, but is not given here to protect the confidentiality of the respondents. When information for a certain field was not given by the respondent, the label NG was placed at the corresponding position. For example (Mark, M, NG, TE> 25, eLE6-10, PM) refers to a male respondent with a pseudonym Mark who did not give information relating to his age. For respondents who did not provide any demographic information at all, the following notation was used: (Respondent Y—demographic data not available), with Y replaced by a letter uniquely identifying the respondent in this presentation (in such cases, pseudonyms could not be assigned as gender information was not available).

6.3.8.1 Elaborating the dimensions of e-Learning systems success

This section discusses the range of instructors' views regarding the dimensions of e-Learning systems success explicitly covered by the survey. Instructors who provided comments tended to focus on organisational aspects. Respondents were explicitly asked for suggestions of new dimensions of e-Learning systems success. Two suggested organisational leadership, two identified student readiness, and one suggested the degree of blending.

I interpreted organisational leadership as an aspect of e-Learning development and implementation process; therefore, it is discussed in this section. Degree of blending and the student readiness were interpreted as new dimensions (degree of blending—as a teacher dimensions, and student readiness—as a student dimensions). Therefore, they are covered in a separate section (section 6.3.7.2).

e-Learning development and implementation—instructor involvement

A number of the respondents that were involved in e-Learning implementation at organisational level elaborated on their satisfaction with e-Learning. Jane explained,

> I'm fortunate to be working in a team who are at the forefront of e-Learning and ICT innovation, evaluation is consistently maintained at many levels to ensure we are providing the highest quality programmes and support to learners and teaching colleagues. (Jane, F, A36-45, TE21-25, eLE1-5, PM).

Sera suggested that for as long as organisation level support is of high quality, other organisation level activities do not matter that much, "Recent survey [*sic*] the first to ask for teacher opinion on the current LMS and support but we do have good communication with our online support and they are responsive to our development needs." (Sera, F, A46-55, TE21-25, eLE6-10, PM).

On the other hand, respondents who were not involved in e-Learning development and implementation expressed their dissatisfaction relating to lack of involvement in e-Learning development and a lack of proper evaluation of e-Learning systems success, particularly with respect to instructor satisfaction. Some of the comments were, "Much of the e-Learning was developed by techie enthusiasts with very little understanding of the nature of e-Learning itself." (Jenifer, F, A>55, TE>25, eLE11-15, PM), "I have never been consulted on the e-Learning environment at this institution." (Lisa, F, A46-55, TE11-15, eLE1-5, PM), "Note that I have never been asked how satisfactory I consider the e-Learning programme or learning management system to be." (Annette, F, A46-55, TE21-25, eLE11-15, PS). Jenney emphasised the disempowerment of the instructors,

> Very little is done to consult lecturers – a very commodified approach is taken. The centre that runs e-Learning tries to tell lecturers what to do. Evaluation is mainly of student satisfaction which is only one part of the picture. (Jenney, F, A46-55, TE11-15, eLE6-10, PM).

A number of respondents pointed out that lack of proper evaluation or poor evaluation contribute to poor awareness of e-Learning effectiveness. For example, respondents commented that, "No evaluation of effectiveness of course [sic] apart from three yearly student evaluation." (Denis, M, A>55, TE>25, eLE11-15, PM), "e-Learning developments in my college and department are largely driven by the initiatives of individual lecturers. There is no college level or departmental level plan or evaluation programme." (Paul, M, A>55, TE>25, eLE1-5, PM), "There is no effectiveness evaluation system in place at this institution." (Pauline, F, A> 55, TE>25, eLE11-15, PM), and "Evaluation of the e-Learning as one which enhances teaching and learning is the subject of ongoing debate." (Smith, M, A36-45, TE6-10, eLE1-5, PM).

Others emphasised the need to put sufficient effort into evaluation research, "Not nearly sufficient research is carried out by the institution as to the efficacy of e-Learning. It is more about the $ than anything else." (Mark, M, NG, TE>25, eLE6-10, PM), "Do not believe there is enough research to robustly evaluate e-learning or take into account those who enjoy teaching." (Richard, M, A46-55, TE11-15, eLE1-5, PM).

e-Learning development and implementation—institutional policy limitations

A number of respondents viewed restrictions imposed by institutional policy as barriers undermining the quality. Some respondents revealed that they use a limited number of functions of the e-Learning system due to predetermined university regulations: "University regulations don't allow submission of assignments via LMS."

(Angeline, F, A46-55, TE>25 years, eLE>15, PM), "My e-Learning work is mainly online for distance students and some features are used, others not due to predetermined requirements e.g. issuing grades." (Respondent Y—demographic data not available), "Institutional regulations determine matters regarding assignments, not the intrinsic nature of the e-Learning system." (Grace, F, A>55, TE>25, eLE< 1 year, PM), "Online submission is not encouraged by the institution." (George, M, A>55, TE>25, eLE11-15, PM), and “Assignments in this institution must be handed in hard copy for students on campus.” (Linda, F, A46-55, TE>25, eLE1-5, PM). In most cases, barriers were related to assignment submission procedures.

e-Learning development and implementation—forced lack of face-to-face contact

A number of respondents noted the lack of personal contact in online teaching as a cause of frustration. They commented that universities had forced them to implement e-Learning; that is, it was not their choice. Kathy, with more than 25 years of teaching experience, believed that “Teaching is all about communication face-to-face. To be forced to do it online doesn’t cut it in my view.” (Kathy, F, A>55, TE>25, eLE1-5, PM). Jonathan noted that “We have no choice…stuck with our distance offering…again there seems to be blind faith that it works for all students.” (Jonathan, M, A46-55, TE6-10, eLE1-5, PM).

Respondents emphasised that face-to-face communication is essential for effective teaching. Sharron, with more than 25 years of teaching experience, and, thus, likely to be highly proficient at teaching in traditional settings, commented, “Depends on the nature of the course and the proportion of e-Learning. In teacher education, face-to-face interaction is still a critical component to enable modelling of effective pedagogy”. (Sharron, F, A>55, TE>25, NG, PM). Phil, also with more than 25 years of teaching experience, offered a view from the perspective of teacher satisfaction, quite separately from how effective teaching is: “Teaching like this is very much less professionally satisfying than teaching face-to-face. I never wanted to be a correspondence school teacher.” (Phil, M, A>55, TE>25, eLE6-10, PM). Phil adopted this rather negative view of e-Learning despite his considerable experience at using e-Learning.

e-Learning development and implementation—frustrations with workload and hours

A number of participants discussed their frustration with what they perceived as increases in unpaid workload and unpaid hours due to the introduction of e-Learning systems. They felt that they did not have time to seek support or to develop competence and confidence in using e-Learning, which negatively affected the successful implementation of e-Learning. One of the respondents summarised the frustrations by distinguishing e-Learning as a practice from the way it was introduced,

> While the decision to use e-Learning was a good move, the time spent on teaching us to use it, and the workload e-Learning has brought with it upon us left me dissatisfied because when I prepare materials for teaching, by researching, conceptualising, planning, trialling, implementing, assessing, reflecting, and modifying my courses for the following year, I do it comprehensively, and I make sure I know what I am doing, and what could happen. But when the process of introducing e-Learning was done in the way it was done, I felt it was almost against the process of learning, to know, to know how to do it, and to do it well! (Respondent Z—demographic data not given).

Bridget singled out the lack of time as a constraint that cannot be mitigated by providing support: "Technical/design staff offer advice and help in integrating new learning strategies. Time for lecturers to develop competence and confidence in new e-Learning systems is minimal and constrains effective implementation." (Bridget, F, A>55, TE21-25, eLE6-10, PM).

For Kathy, the time and effort necessary to deliver online defined her negative attitude to e-Learning: "Had to struggle to develop stuff to be interactive online and it took untold hours of unpaid work. I am not impressed with this whole embracing of e-Learning stuff. It's more soul-destroying than anything." (Kathy, F, A>55 years, TE>25, eLE1-5, PM). For Mary, the time and effort required to use e-Learning determined the range of e-Learning functionality she uses:

> To be honest, I really only use e-Learning as information distribution system, and have long ago decided I cannot afford the time to use it otherwise. I was responsible for running online forums for courses…it was a nightmare! Took may be 5-10 hours a week.… As a lecturer there is no way that I have that kind of time to devote to teaching. I want an e-Learning system that takes up a minimum of my time. (Mary, F, A35-46, TE11-15, eLE6-10, PM).

Bob noted that because of e-Learning, work and private life were no longer separate: "e-Learning systems blur the work and private life boundary for teachers. It is no longer a say 9-5 job. Teaching never stops now." (Bob, M, A46-55, TE16-20, eLE1-5, PM).

Steve emphasised that extra workload associated with e-Learning is not recognised at organisational level: "The huge extra workload associated with on line classes is a major problem for lecturers. This is not acknowledged by the university system."(Steve, M, A>55, TE>25, eLE6-10, PM).

The instructors' perceptions of the workload associated with e-Learning ranged from lack of time to develop competency in e-Learning or to develop and deliver e-Learning courses to difficulty in separating the work and private life or even partial or full rejection of e-Learning because of the extra workload.

e-Learning development and implementation—institution-wide success

Silvia discussed e-Learning success in terms of, "How consistent the use of e-Learning across courses." (Silvia, F, A46-55, TE11-15, eLE1-5, PM). She perceived e-Learning systems success as not relating to a single course but rather referred to the overall use of e-Learning systems across the institution as a measure of success.

Another respondent, although overall satisfied with the current practice, emphasised the need for effective university-wide evaluation, "Within our programme, the most effective evaluation is at college level, including feedback from students. However, this is probably not sufficiently formalised for reliable university-wide evaluation purposes." (Respondent X—demographic data not given).

e-Learning development and implementation—organisational leadership

Aimee, with more than 15 years of experience in online teaching, suggested organisational leadership (Aimee, F, A>55, TE>25, eLE>15, PS) as another dimension in e-Learning systems success, in addition to the dimensions explicitly covered in the survey. In a related comment, Jane described her experience as, "Inspiring leadership has been instrumental to my embracing ICT as a teaching tool." (Jane, F, A36-45, TE21-25, eLE1-5, PM).

Institutional support—institutional support giving instructors confidence

A number of respondents reported that institutional support has given them confidence in using the e-Learning system. Olive stated that,

> I am confident in using this system because I have been shown how to use this system. I would need further instructions to fully use all aspects available for teaching and I would not manage without any instructions at all. (Olive, F, A46-55, TE>25, eLE6-10, PM).

Another comment showed the importance of institutional support in using the e-Learning system, "I am still learning from others but enjoy it thoroughly. Also, our technical support team is fabulous and always on call to help which adds to my confidence in using the system." (Jane, F, A36-45, TE21-25, eLE1-5, PM).

Institutional support—instructor e-Learning experience giving confidence

The respondents' identified their e-Learning experience as contributing to their self-confidence in the use of the e-Learning system and their satisfaction. For example, Russell said: "My experience over more than a decade means I am very comfortable. I also like computers and the whole e-Learning and i-society field. I am always learning new ways to use e-Learning tools in my teaching." (Russell, M, NG, eLE11-15, PM). Another respondent added that, "Reasonable experience has given me reasonable confidence to tackle the challenges…also time and experience helps in terms of developing understanding and familiarity with systems." (Respondent W—demographic data not given).

Institutional support—perceived lack of support

In view of some of the respondents, institutional support was lacking either in certain aspects or completely. For example, Charlotte commented, “Not really happening for us—it’s all learning by trial.” (Charlotte, F, A46-55, TE21-25, eLE1-5, PM). Similarly, Noeline suggested that institutional support was lacking in terms of both support to instructors and learners in relation to e-Learning, “This is the weakest aspect of our e-Learning teaching and learning tools. SUPPORT [responder emphasis] to use it and this is for students as well.” (Noeline, F, A46-55, TE16-20, eLE6-10, NG).

Anne suggested that support was not available as and when needed and was not of desired quality.

> Assistance is expensive, and, thus, defeats the financial purpose of teaching online. Hence, is not freely available, and is usually sulky when found. Resources are non-existent, except for the \Help\ file, which of course is not available when the system is down. (Anne, F, NG, TE>25, eLE6-10, PS).

Jonathan discussed the lack of local support for online teaching.

> Sad to say at the Dept level we receive little support …we would have to go looking for it if there is any…and this is in a Dept that prides itself on its distance education expertise.… Campus wide things are a little better e.g. Workshops etc. (Jonathan, M, A46-55, TE6-10, eLE1-5, PM).

Inconsistent or irregular support in relation to online teaching was another issue raised by the respondents. Peter noted, “I have seen an instructor once for a few minutes and then never again. There is no follow up and no ongoing support.” (Peter, M, A>55, TE>25, eLE6-10, PM).

One of the respondents suggested that irregularity of support is a deliberate policy, which was viewed by the respondent as counterproductive.

> Support must be actively sought. It is available, but there is often a sense of having to beg for support. There is also an assumption that having been supported once, the staff should then be independent and need less tech support, which can hinder innovation. (Jacky, F, A36-45, TE16-20, eLE6-10, PM).

System quality—reliability

Aimee identified system reliability as a measure of success (Aimee, F, A>55, TE>25, eLE>15, PS). In a similar comment, John, with more than 25 years of teaching experience, explained his experience as, “Reliability of the e-Learning system needs to be maintained.” (John, M, A>55, TE>25, eLE6-10, PM).

System quality—usability and accessibility

Courtney conceptualised e-Learning system quality as usability, which she perceived as relative to user experience, “The quality of the e-Learning system is variable. It appears user friendly and logical to those familiar with how it works, but it is harder to access for new users.” (Courtney, F, A>55, TE21-25, eLE6-10, PM).

A number of respondents highlighted the specific functionality that hindered their use of e-Learning system. For example, Natasha commented,

> The server which has supported the LMS has been slow and inadequate to date. Uploading files and even responding to simple posts took forever. We use MOODLE - it is okay but some unnecessary steps in using some of the tools and instructions [*sic*] not always clear. (Natasha, F, A46-55, TE11-15, eLE6-10, PM).

Chelsea viewed the user interface design as less than optimal, “The system is quite clunky in terms of uploading files and managing the course. There's a lot of clicking and scrolling involved. Although it has more tools that WebCT, it's actually a bit clunky in terms of usage.” (Chelsea, F, NG, TE21-25, eLE11-15, PS), and Doris perceived the software used in the e-Learning system as outdated: “The software used for e-Learning is rather outdated and needs revising.” (Doris, F. A>55, TE>25, eLE6-10, PM).

Olivia implied that the quality of the functionality available shaped how she used the system: “The e-Learning system I use is not particularly conductive to peer-to-peer collaboration”. (Olivia, F, A>55, TE>25, 6-10, PM).

System quality—system quality versus instructor capability

Another aspect noted by the respondents was how instructors' real or perceived capabilities in using the system shaped how they used the system: “Our system has many more capabilities than are currently used by the majority of lecturers." (Paul, M, A>55, TE>25, eLE1-5, PM), "The collaboration tools are effective, but are not intuitive to setting up." (Lin, F, A>55, TE11-15, eLE1-5, PM), and "e-Learning technology is more advanced than the teacher ability to use it." (Simon, M, A>55, TE>25, eLE1-5, PM).

6.3.8.2 New dimensions suggested by the respondents

This section presents respondents' views regarding the new dimensions (additional to the ones explicitly covered in the survey) of e-Learning systems success.

Degree of blending

One of the respondents suggested that the degree of blending, that is, the relative proportion of face-to-face contact and online components, should be carefully decided based on the course requirements. Thus, the extent to which the degree of blending meets the course requirements constitutes a dimension of e-Learning systems success.

Margaret, with more than 25 years of teaching experience, suggested that the degree of blending should be decided based on a "consideration of factors such as the level (undergraduate, postgraduate), the learners (e.g. age, fulltime/part time, previous experience/interest in e-Learning, and motivation), discipline area, instructor facilitation and social presence" (Margaret, F, A>55, TE>25, eLE1-5, PM). Although Margaret was relatively new to e-Learning, it did not prevent her making constructive and insightful comments about how it should be implemented.

Student readiness

Student readiness was another dimension suggested by the respondents. Thus, the success in e-Learning depends not only on the efforts of the institutions and of the instructors, but also on student background. Aimee suggested student readiness as a success dimension (Aimee, F, A>55, TE>25, eLE>15, PS). Similarly, Bridget reported, "For e-Learning success, students must have some competence and confidence in using electronic systems before enrolling." (Bridget, F, A>55, TE21-25, eLE6-10, PM).

6.4 e-Learning systems success: The study from the learner perspective

In this study, data were collected from students enrolled in level one IT related papers in New Zealand universities. A detailed description of the sample for this survey was given in section 5.3.3.

6.4.1 Data collection and response rate

Data collection for this study was carried out over a two-month period in August and September 2010. The questionnaire was posted on the course web sites. As contact details of individual students were not known, no reminders were used in this study. From 247 responses, 189 were usable for data analysis after discarding 58 incomplete responses (as in the study from the instructor perspective, following Tian et al. (2003), responses with more than 20% data missing were considered incomplete). The response rate (including incomplete responses) was 8.82%, and 6.75% of the responses received were usable after removing incomplete responses. It was not possible to send personalised survey invitations to potential participants because contact details of individual students were not available for the study. Thus, it is possible that some of the potential participants never saw the invitation, and it was not possible to send reminders.

Even though the response rate was considerably lower than in the instructor survey, it should be seen as satisfactory because it was consistent with similar studies conducted in past. Past studies with students from several universities as participants reported similar response rates (below 10%) even for personalised surveys with follow up reminders (George-Walker & Keeffe, 2010; Grandcolas, Rettie, & Marusenko, 2003; Klemenc-Ketis, Hladnik, Rotar-Pavlic, Post, & Kersnic, 2010; Kitchenham, Budgen, Brereton, & Woodall, 2005). Low response rate suggests higher likelihood of non-response bias, as it is possible that only participants with some peculiar and rare charactristics, not representative of the target population, may have responded. Even though bias checks were conducted (see section 6.4.2) and did not detect bias, the results for the student survey should be treated with caution.

6.4.2 Checking for non-response bias

As in the study from the instructor perspective, non-response bias was tested with known sample characteristics to evaluate the effect of non-response bias. The non-response bias (as discussed in section 6.3.2) was examined by using *t*-tests at 5% significance level ($p < .05$) to compare early respondents with late respondents. Respondents who responded within two weeks after the link was posted were considered early respondents, and those who responded after that were considered late respondents. Basic demographic data (gender, age, and experience) was used for the comparison, as suggested by Al-Qirim (2007). The difference between respondents and non respondents was not statistically significant (see Table 6.23). Thus, the result of the test suggested that there was no non-response bias.

Table 6.23 Comparison Between Early and Late Respondents in the Study from the Learner Perspective

Construct	*p* value
Experience	.683
Gender	.128
Age	.081

6.4.3 Respondent demographics

A discussion of the demographic information of the respondents is presented in this section. The analysis was based on age, gender, online learning experience, and mode of study (on campus or distance). The demographic characteristics of the student sample in tabular form are given in Appendix O.

As shown in the Figure 6.7, the majority (62%) of the respondents were male. Thus, the number of male respondents was almost double than that of female respondents. An overwhelming majority of the participants (85%) were younger than 30, roughly equally divided between less than 20 and 20 to 30 age ranges (see Figure 6.8).

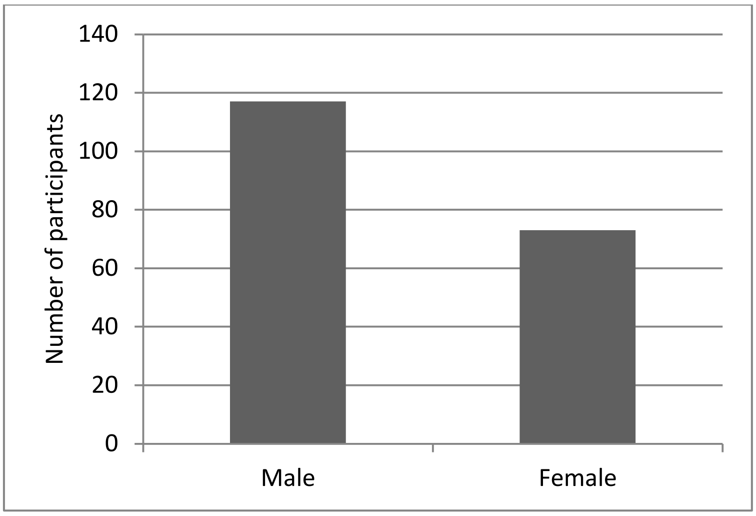


Figure 6.7 Distribution of participants by gender.

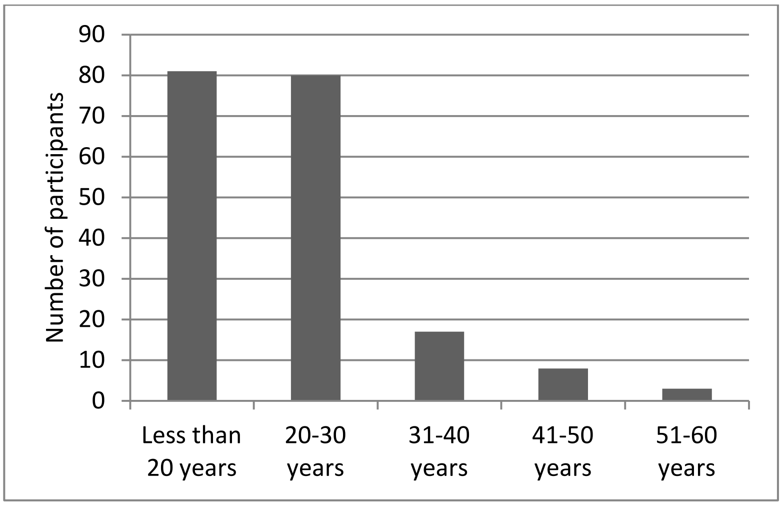


Figure 6.8 Distribution of participants by age.

The majority (87%) of the respondents were studying internally on campus, with the rest studying as distance learners (see Figure 6.9). For about one third (32%) of the respondents, their e-Learning experience was limited to the paper in which the survey was conducted. Thus, they had about two months of e-Learning experience, as the survey started two months after the beginning of the semester. Another one third (34%) had experience in using e-Learning in one or two papers (see Figure 6.10). This indicates that majority of the respondents were novice users of e-Learning systems.

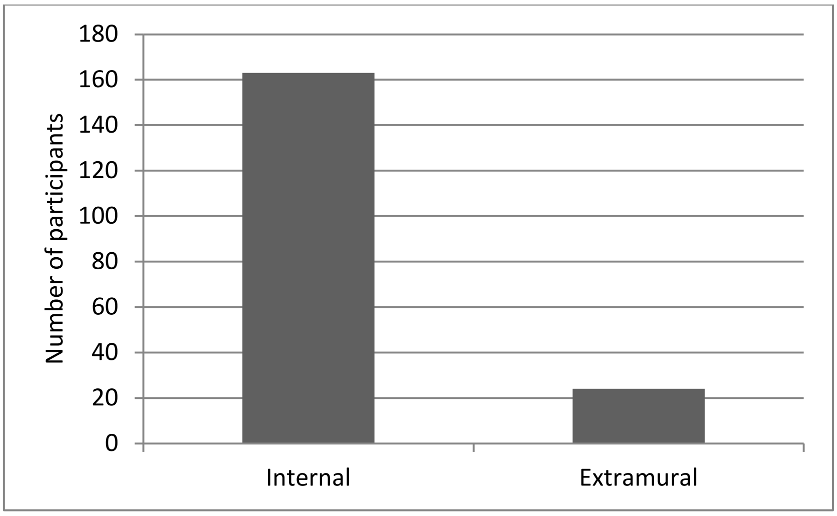


Figure 6.9 Distribution of participants by mode of study.

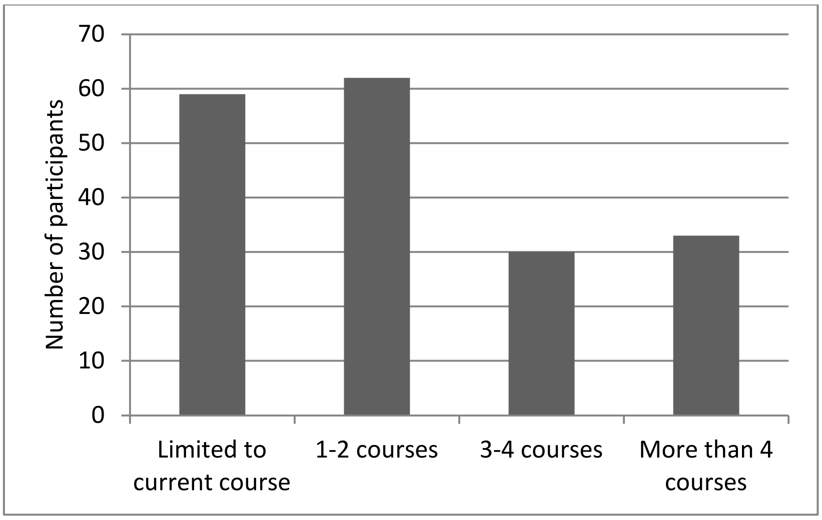


Figure 6.10 Distribution of participants by previous e-Learning experience.

6.4.4 Testing the measurement model

Similar to the study from the instructor perspective, data collected from the student survey were analysed using PLS (Hansmann & Ringle, 2004), with SmartPLS version 2.0 software. The PLS measurement model results for this study are discussed in the following sections.

6.4.4.1 Reliability analysis

The factor loadings should be greater than .5 to indicate reliable items (Hair et al., 2010). As shown in Table 6.24 (in bold), the loadings for the majority of items were greater than .5, indicating acceptable item reliability, except for two items in quality of the institutional support to learners construct (INSL4 and INSL5, with loadings .48 and .34, respectively) (Refer to section 5.4.2 for the full text of these items.) All Cronbach alpha values and composite reliability values were greater than .7, which Nunnally (1978) suggested as a threshold for adequate internal consistency reliability (see Table 6.25).

Although the composite reliability value and the Cronbach alpha value for quality of the institutional support to learners construct were above the threshold value, the item with a particularly poor loading (INSL5, with loading .34) was removed from the measurement model. As a result, the Cronbach alpha value for quality of the institutional support to learners construct was improved from .70 to .77 (well above the threshold value). The wording of the removed item INSL5 was "students can register online for courses". Arguably, the item referred to a very specific aspect of system functionality, rather than to institutional support to learners. Therefore, it was judged that the removal of this item did not substantially affect the content of the construct (and may have improved the content coverage by making it closer to the intent of the construct).

Table 6.24 Factor Loadings and Cross Loadings for the Measurement Items in the Student Survey

Item	CQS	CI	INS	ISSS	SSAT	SL	SSEF	SQS	SUS	TV
SUS1	.49	.39	.27	.34	.43	.33	.12	.36	**.83**	.22
SUS2	.35	.51	.25	.38	.42	.37	.18	.33	**.66**	.28
SUS3	.48	.46	.28	.31	.49	.28	.20	.43	**.87**	.27
SSAT1	.51	.52	.52	.52	**.78**	.38	.40	.64	.39	.28
SSAT2	.59	.65	.50	.53	**.86**	.42	.40	.66	.53	.31
SSAT3	.47	.68	.29	.40	**.83**	.38	.36	.55	.49	.32
SSAT4	.45	.63	.37	.48	**.83**	.41	.46	.61	.46	.31
SQ1	.50	.50	.32	.39	.55	.30	.36	**.69**	.45	.22
SQ2	.58	.52	.55	.54	.64	.43	.41	**.80**	.39	.23
SQ3	.55	.44	.41	.45	.53	.34	.46	**.76**	.31	.23
SQ4	.61	.47	.51	.58	.52	.42	.43	**.80**	.32	.25
SQ5	.67	.49	.62	.59	.62	.35	.46	**.86**	.37	.25
SQ6	.51	.46	.50	.52	.47	.52	.30	**.61**	.29	.42
CQS1	**.76**	.38	.33	.36	.41	.38	.25	.55	.51	.26
CQS2	**.82**	.40	.51	.54	.46	.44	.35	.65	.39	.28
CQS3	**.62**	.43	.49	.55	.41	.31	.11	.47	.38	.22
CQS4	**.84**	.49	.56	.61	.55	.47	.33	.61	.45	.32
CQS5	**.83**	.46	.46	.55	.53	.46	.40	.65	.43	.34
ISSS1	.55	.40	.54	**.80**	.44	.47	.24	.56	.29	.28
ISSS2	.52	.42	.55	**.75**	.46	.48	.27	.52	.29	.39
ISSS3	.61	.47	.59	**.78**	.48	.47	.36	.61	.34	.27
ISSS4	.53	.40	.52	**.79**	.38	.41	.20	.47	.33	.23
ISSS5	.53	.45	.59	**.83**	.42	.38	.31	.55	.35	.26
ISSS6	.59	.53	.54	**.79**	.48	.43	.47	.60	.34	.35
ISSS7	.51	.51	.47	**.73**	.50	.43	.45	.53	.39	.43
ISSS8	.48	.46	.57	**.77**	.44	.42	.33	.46	.40	.39
INSL1	.51	.34	**.87**	.57	.40	.40	.35	.54	.34	.23
INSL2	.33	.28	**.78**	.53	.35	.37	.34	.45	.18	.15
INSL3	.59	.42	**.90**	.66	.47	.50	.45	.63	.28	.31
INSL4	.28	.11	**.46**	.32	.17	.24	.20	.25	.00	.25
SSEF1	.33	.45	.41	.42	.40	.38	**.84**	.49	.20	.32
SSEF2	.35	.47	.42	.40	.50	.39	**.90**	.50	.20	.41
SSEF3	.22	.28	.24	.22	.27	.31	**.75**	.33	.12	.31
SSEF4	.35	.43	.39	.37	.44	.34	**.88**	.45	.20	.30
SL1	.45	.40	.45	.40	.37	**.79**	.39	.42	.29	.45
SL2	.42	.31	.33	.38	.33	**.74**	.30	.41	.22	.29
SL3	.37	.38	.36	.40	.32	**.78**	.20	.39	.29	.33
SL4	.41	.58	.40	.47	.47	**.82**	.38	.43	.40	.53
CI1	.57	**.95**	.43	.56	.74	.53	.51	.64	.58	.50
CI2	.53	**.96**	.42	.56	.71	.52	.48	.61	.54	.44
CI3	.48	**.92**	.39	.54	.68	.49	.41	.56	.51	.44

Note: SUS=Learner use of the e-Learning system, SSAT=Student satisfaction, SQS=Quality of the e-Learning system, CQS=Quality of the e-Learning content, ISSS=Quality of the instructor support to learners, INS=Quality of the institutional support to learners, SSEF=Learner self-efficacy, SL=Level of student learning, CI=Learner intention to continue e-Learning

Table 6.25 Internal Consistency Reliability and Convergent Validity of Measures Used in the Study from the Learner Perspective

Construct name	No of items	Composite reliability	Cronbach alpha	AVE
Quality of the e-Learning content	5	.88	.83	.61
Quality of the e-Learning system	6	.89	.85	.57
Quality of the instructor support to learners	8	.93	.91	.61
Quality of the institutional support to learners	4	.85	.77	.60
Learner satisfaction	4	.90	.84	.68
Learner use of the e-Learning system	3	.83	.71	.63
Level of learning	4	.86	.79	.62
Learner intention to continue e-Learning	3	.96	.94	.89
Learner self-efficacy	4	.91	.87	.72

6.4.4.2 Validity analysis

Similar to the study from the instructor perspective, convergent validity and discriminate validity tests (see section 5.6.2) were used to assess the validity of the measures.

Item reliability and internal consistency reliability checks presented in section 6.4.4.1 can be also seen as assessing convergent validity (as discussed in section 5.6.2.3). Item reliability and internal consistency reliability was also an evidence of construct validity. Table 6.25 demonstrates that all constructs had AVE values greater than .5. Therefore, the measures had satisfactory convergent validity.

Table 6.26 reports the discriminant validity results of the measurement model for the study from the learner perspective. The square roots of AVE values (diagonal elements) were higher than correlation values in the off-diagonal elements of corresponding rows and columns. Moreover, as shown in Table 6.24, all items loaded higher on their own construct than on other constructs in the model. Therefore, the AVE and the item cross loadings fulfilled the requirements of discriminant validity.

Thus, the measures used in the model passed all reliability and consistency checks introduced in section 5.6.2. The psychometric properties of the measurement model were found to be satisfactory, justifying further analysis of the research model.

Table 6.26 Discriminant Validity Results for the Student Survey

Construct	CQS	CI	INS	ISSS	SSAT	SL	SSEF	SQS	SUS	TV
CQS	.78									
CI	.56	.94								
INS	.61	.44	.77							
ISSS	.69	.60	.71	.78						
SSAT	.61	.75	.51	.58	.83					
SL	.53	.54	.49	.53	.49	.78				
SSEF	.38	.50	.44	.45	.49	.42	.85			
SQS	.73	.64	.64	.69	.72	.53	.54	.76		
SUS	.56	.58	.34	.45	.57	.39	.22	.47	.79	

Note: SUS=Learner use of the e-Learning system, CQS=Quality of the e-Learning content, CI=Learner intention to continue e-Learning, INS=Quality of the institutional support to learners, ISSS=Quality of the instructor support to learners, SSAT=Learner satisfaction, SL=Level of learning, SSEF=Learner self-efficacy, SQS=Quality of the e-Learning system

6.4.5 Testing the structural model

The structural model testing results are presented in Figure 6.11. As in Figure 6.6 showing the result for the model from the instructor perspective, paths found to be statistically significant at confidence level p =.05 are shown as continuous lines, and paths that were not statistically significant are shown as dotted lines. Path coefficients are shown next to hypotheses labels; p values are shown in parentheses, under the corresponding path coefficients.

The R^2 values (variance explained) for each of the variables are given in Table 6.27 and in Figure 6.11. The model explained 62% of the variance in learner intention to continue e-Learning, 26% of the variance in level of learning, 56% of the variance in learner satisfaction, and 41% of the variance in learner use of the e-Learning system. All R^2 values were above 10%, the threshold value suggested by Falk and Miller (1992), indicating that the model has a substantive explanatory power.

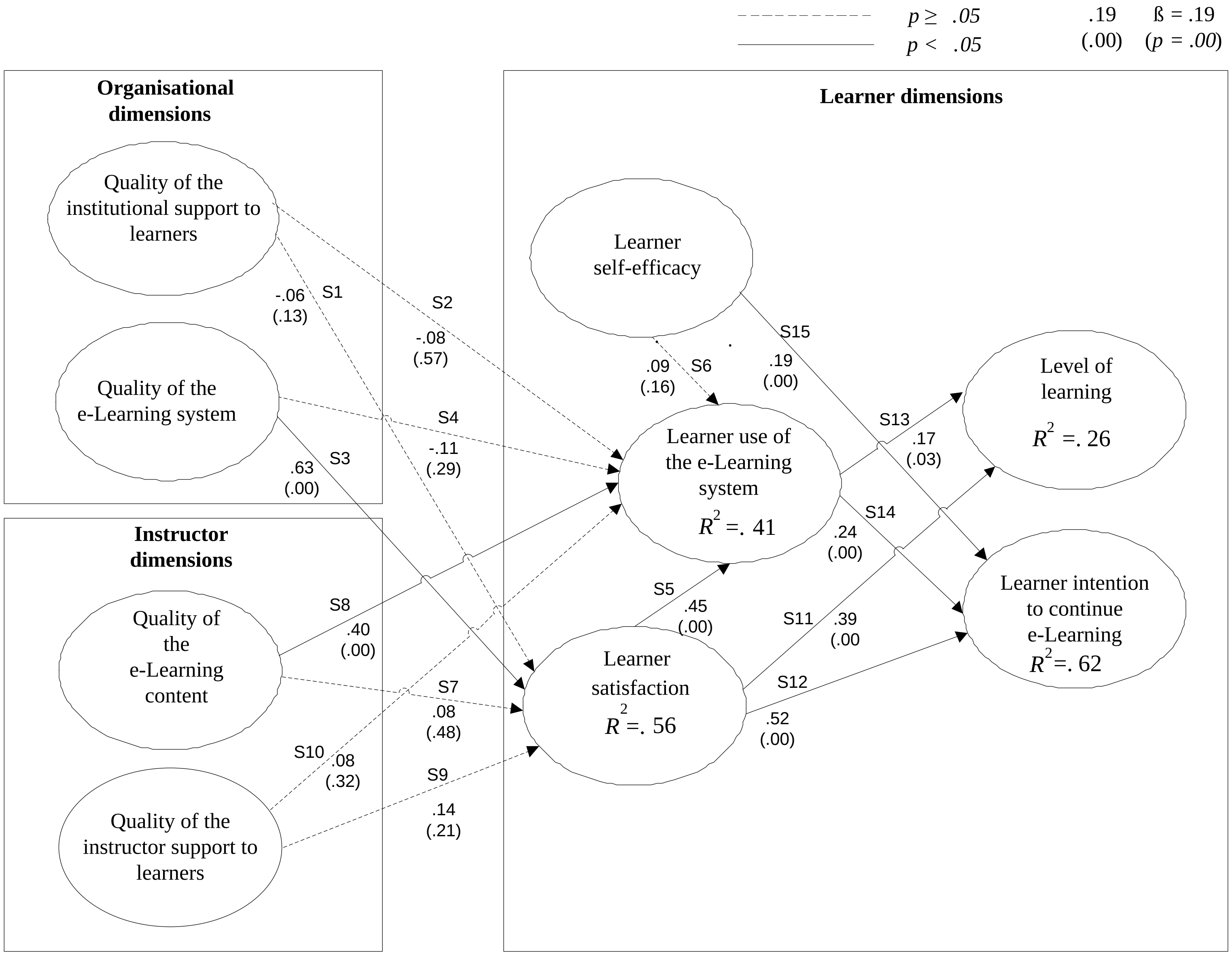


Figure 6.11 Model testing results for the study from the learner perspective.

Table 6.27 Variability Explained (**R^2**) for Dependent Variables in the Model from the Learner Perspective

Construct	R^2
Learner use of the e-Learning system	.41
Learner satisfaction	.56
Level of learning	.26
Learner intention to continue e-Learning	.62

The following subsections present the results for individual hypotheses introduced in section 4.4. Similar to the study from the instructor perspective, p = .05 was used as the threshold for statistical significance. Eight out of the 15 hypotheses in the model from the learner perspective were supported. As in the discussion of the model from the instructor perspective (see section 6.3.5), in the discussion of the outcomes of hypotheses testing, I followed Kline, (2011): paths with β less than .1 were considered to correspond to small effects, paths with β around .3 were considered to correspond to medium effects, and paths with β greater than .5 were considered to correspond to large effects.

6.4.5.1 The higher the quality of the content, the e-Learning system, the instructor support to learners, and the institutional support to learners, the higher the level of learner use of the e-Learning system

Table 6.28 The Higher the Quality of the Content, the e-Learning System, the Instructor Support, and the Institutional Support to Learners, the Higher the Level of Learner Use of the e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
S8	The higher the quality of the content provided via e-Learning system, the higher the level of learner use of the e-Learning system	.40	$p < .001$	Supported

S4	The higher the quality of the e-Learning system, the higher the level of learner use of the e-Learning system	-.11	.29	Not supported
S10	The higher the quality of the instructor support to learners in relation to e-Learning, the higher the level of learner use of e-Learning system	.08	.32	Not supported
S2	The higher the quality of the institutional support to learners in relation to e-Learning, the higher the level of learner use of e-Learning system	-.08	.57	Not supported

As shown in Table 6.28, quality of the e-Learning content affected learner use of the e-Learning system ($p < .001$) with a medium effect size. This indicates that when the quality of the content provided via e-Learning system is high, learners are more likely to use the e-Learning system.

The finding is consistent with previous IS research (Wang & Liao, 2008) and e-Learning success research (Holsapple & LeePost, 2006). Wang and Liao reported a relationship between information quality and system use, with medium effect size, in a study validating DeLone and McLean's (2003) IS success model in the context of an e-Government system. Although Holsapple and LeePost suggested a similar relationship in an e-Learning systems success study, they reported only descriptive data and did not validate the model, so that the effect size was not known.

The effect of quality of the e-Learning system on learner use of the system was not statistically significant ($p = .29$). Freeze, et al. (2010) examined e-Learning systems success based on learners' perceptions with a larger sample of learners in a university and found that e-Learning system quality affected system use with a medium effect size. However, in another study, Liu, Cheok, Mei-Ling and Theng (2007) studied the determinants of learner acceptance of technology, and concluded that e-Learning system quality does not affect system use.

The effect of quality of the instructor support to learners on learner use of the e-Learning system (hypothesis S10) and the effect of quality of the institutional support to learners and learner use of the system (hypothesis S2) were not statistically significant ($p = .32$ and $p = .57$, respectively). This suggested that an increase in quality of the instructor support and quality of the institutional support to learners would not encourage learner use of the e-Learning system. The finding is not consistent with the findings of some of the previous IS research and e-Learning research (Holsapple & LeePost, 2006; Wang & Liao, 2008). The Holsapple and LeePost study suggested a positive effect of service quality on learner use of the e-Learning system. Wang and Liao reported a medium effect size for the relationship between service quality and system use in an e-Government systems success study.

A possible justification for the findings in relation to hypotheses S4 may be the fact that the group of respondents for this study comprised level one university undergraduate students, and, thus, they were still novice users of the system. Therefore, quality of the e-Learning system may not have had an impact on their level of use. Furthermore, they may have been having confidence issues in using new technology, and may not yet have been competent enough to use the full functionality of the e-Learning system. However, when they become experienced in using e-Learning systems, the situation may change. The analysis of the demographic data indicated that more than 50% of the respondents were new to online learning environments.

Another justification for the results obtained for hypotheses S2 and S10 is that, according to the preliminary information obtained from paper coordinators, the majority of papers were not being taught totally online, but rather the online component was complementing face-to-face teaching. Therefore, the instructor support provided to learners via the e-Learning system and the institutional support to learners in relation to e-Learning may not have been important for learners due to the opportunity for physical interaction with their instructors on campus. For a study sample of a student group with greater e-Learning experience, and those engaged exclusively in online courses, there is a possibility that the hypotheses S4 and S10 would be confirmed.

6.4.5.2 The higher the quality of the content, the e-Learning system, the institutional support to learners, and the instructor support to learners, the higher the level of learner satisfaction

Table 6.29 The Higher the Quality of the Content, the e-Learning System, the Institutional Support to Learners, and the Instructor Support to Learners, the Higher the Level of Learner Satisfaction

Hypothesis	Description	Path coefficient	p value	Conclusion
S7	The higher the quality of the e-learning content provided via e-Learning system, the higher the level of learner satisfaction	.08	.48	Not supported
S3	The higher the quality of the e-Learning system, the higher the level of learner satisfaction	.63	$p < .001$	Supported
S1	The higher the quality of the institutional support to learners in relation to e-Learning, the higher the level of learner satisfaction	-.06	.13	Not supported
S9	The higher the quality of the instructor support to learners in relation to e-Learning, the higher the level of learner satisfaction	.14	.21	Not supported

The effect of quality of the e-Learning content on learner satisfaction (see Table 6.29), was not statistically significant ($p = .48$). The finding is not consistent with previous e-Learning success research (Chiu, Chiu, et al., 2007; Lee & Lee, 2008; Freeze et al., 2010). It was reported in previous studies that quality of the content affected learner satisfaction. However, previous studies were carried out in totally online contexts. Therefore, it can be argued that as the respondents of this study were mainly from face-to-face class environments with some online components, they may not have been particularly interested in or focused on the online content. Thus, quality of the e-Learning content may not have had an effect in terms of increasing their level of satisfaction.

As shown in Table 6.29, quality of the e-Learning system affected the level of learner satisfaction ($p < .001$) with a large effect size. This indicates that when quality of the e-Learning system is high, learners are more likely to be satisfied by the e-Learning system. This finding is consistent with previous e-Learning systems success studies (Chiu, Chiu, et al., 2007; Lin, 2007). Chiu, Chiu, et al. studied student e-Learning continuance intention and found that quality of the e-Learning system affected learner satisfaction, with a medium effective size. Lin found a similar relationship with a weak effect size in a study to validate an e-Learning system success model based on the IS success model (DeLone & McLean, 2003).

As shown in Table 6.29, the relationship between quality of the institutional support to learners and the level of learner satisfaction was not statistically significant ($p = .13$). The finding is not consistent with the findings of previous e-Learning research (Lee & Lee, 2008; Samarawikrema & Stacey, 2007). A potential explanation for the finding is that the respondents of this study might not have had much interest in e-Learning, as they still had the option of learning face-to-face in classroom settings. Therefore, it is possible that they were not involved in e-Learning enough for any institutional support to make a difference.

The effect of quality of the instructor support to learners on learner satisfaction, as presented in Table 6.29, was not statistically significant ($p = .21$). The finding is not consistent with the findings of previous research in the e-Learning success context (Holsapple & LeePost, 2006; Lee & Lee, 2008) where the studies found a relationship between service quality and learner satisfaction. This, again, could be due to a relative lack of emphasis specifically on e-Learning. As the respondents in this study had been physically interacting with their instructors on campus, it is likely that instructor support was provided primarily face-to-face, so that the instructor support provided via the system did not make any difference. This suggests that future research with students studying totally online might give results supporting the hypothesis.

6.4.5.3 The higher the level of learner satisfaction with e-Learning, the higher the level of learner use of the e-Learning system

Table 6.30 The Higher the Level of Learner Satisfaction with e-Learning, the Higher the Level of Learner Use of the e-Learning System

Hypothesis	Description	Path coefficient	p value	Conclusion
S5	The higher the level of learner satisfaction, the higher the level of learner use of the e-Learning system	.45	$p < .001$	Supported

As shown in Table 6.30, learner satisfaction affected learner use of the e-Learning system ($p < .001$) with a large effect size. This indicates that when the learner is satisfied with the e-Learning system, they are more likely to use the e-Learning system.

The finding is consistent with previous e-Learning systems success research where studies reported a positive relationship between learner satisfaction and e-Learning system use (Holsapple & LeePost, 2006; Lin, 2007). Lin validated an e-Learning systems success model, a modified DeLone and McLean (2003) IS success model, and found a similar relationship between learner satisfaction and e-Learning system use, with a medium effect size. The Holsapple and LeePost study suggested a positive effect of learner satisfaction on learner use of e-Learning system. They did not validate the model, so that the effect size was not available.

6.4.5.4 *The higher level of learner satisfaction, the higher the level of learning and learner intention to continue e-Learning*

Table 6.31 The Higher the Level of Learner Satisfaction, the Higher the Level of Learning and Learner Intention to Continue e-Learning

Hypothesis	Description	Path coefficient	p value	Conclusion
S11	The higher the level of learner satisfaction, the higher the level of learning	.39	$p < .001$	Supported
S12	The higher the level of learner satisfaction, the higher the level of learner intention to continue e-Learning	.52	$p < .001$	Supported

As shown in Table 6.31, learner satisfaction affected the level of learning ($p < .001$) with a medium effect size. This indicates that when learners are satisfied with e-Learning, they are more likely to achieve a higher level of learning. This finding is consistent with the findings of previous research (Eom et al., 2006). Eom et al. studied the determinants of perceived learning outcomes and learner satisfaction in online education with university undergraduate students who enrolled in totally online courses. They found a similar relationship between learner satisfaction and student learning with a large effect size. It should be noted that the direction of cause and effect in this relationship is not entirely clear. For example, it is possible that learners who did well, and thus achieve a higher level of learning were, as a consequence, more satisfied with all aspects of their learning experience, including e-Learning.

As shown in Table 6.31, learner satisfaction affected learner intention to continue e-Learning ($p < .001$) with a large effect size. This indicates that when the learner is satisfied with e-Learning, they are more likely to continue e-Learning in the future. The finding is consistent with previous e-Learning research (Chiu, Chiu, et al., 2007; Roca et al., 2006). A similar relationship was found by Chiu, Chiu, et al. and Roca et al., with very strong effect sizes. Chiu, Chiu, et al. studied the influence of quality and fairness on learner satisfaction and web-based learning continuance intention with a sample of university undergraduate students who were enrolled in totally online courses. Roca et al. extended the TAM model (Davis, 1989) to examine e-Learning continuance intention with a sample of organisational employees with e-Learning experience.

6.4.5.5 The higher the level of learner use of the e-Learning system, the higher the level of learning and learner intention to continue e-Learning

Table 6.32 The Higher the Level of Learner Use of the e-Learning System, the Higher the Level of Learning and Learner Intention to Continue e-Learning

Hypothesis	Description	Path coefficient	p value	Conclusion
S13	The higher the level of learner use of e-Learning system, the higher the level of learning	.17	.03	Supported
S14	The higher the level of learner use of the e-Learning system, the higher the level of learner intention to continue e-Learning	.24	$p < .001$	Supported

As shown in Table 6.32, the relationship between learner use of the e-Learning system affected the level of learning ($p = .03$) with a small effect size. This indicates that when the level of learner use of the e-Learning system is high, they are more likely to achieve higher level of learning. As shown in Table 6.31, learner use of the e-Learning system affected learner intention to continue e-Learning ($p < .001$) with a medium effect size. This indicates that when the level of learner use of the e-Learning system is high, they are more likely to continue e-Learning. Interpreting level of learning and learner intention to continue e-Learning as aspects of individual impact in DeLone and McLean's IS success model (2003), this finding can be seen as consistent with previous e-Learning systems success research (Holsapple & LeePost, 2006; Lee & Lee, 2008), as explained in section 6.3.5.12.

6.4.5.6 The higher the level of learner self-efficacy, the higher the level of learner use of the e-Learning system

Table 6.33 The Higher the Level of Learner Self-efficacy, the Higher the Level of Learner Use of the e-Learning System

Hypothesis	Description	Path coefficient	*p* value	Conclusion
S6	The higher the level of learner self-efficacy, the higher the level of learner use of the e-Learning system	.09	.16	Not supported

As shown in Table 6.33, the relationship between learner self-efficacy and learner use of the e-Learning system was not statistically significant ($p = .16$). This finding suggested that learner confidence with respect to using the e-Learning system does not affect learner use of e-Learning system. This result is not consistent with the findings of previous research (Yi & Hwang, 2003). Yi and Hwang extended the TAM (Davis, 1989) with motivation variables to examine the use of web-based learning systems. They found a relationship between learner self-efficacy and e-Learning system use with a medium effect size.

A possible justification for the finding of this study is that the measure for learner use of the e-Learning system emphasised frequency of use, rather than sophistication of use. It may be the case that students frequently used the system to use very simple functionality involving tasks that could not be performed off-line, such as downloading PowerPoint slides. Then, low self-efficacy did not matter as much as it would if the level of sophistication were incorporated into the measure.

6.4.5.7 The higher the level of learner self-efficacy, the higher the level of learner intention to continue e-Learning

Table 6.34 The Higher the Level of Learner Self-efficacy, the Higher the Level of Learner Intention to Continue e-Learning

Hypothesis	Description	Path coefficient	p value	Conclusion
S15	The higher the level of learner self-efficacy, the higher the level of learner intention to continue e-Learning	.19	$p < .001$	Supported

As shown in Table 6.34, learner self-efficacy affected learner intention to continue e-Learning ($p < .001$) with a small effect size. This indicates that when learners have confidence in using the e-Learning system, they are more likely to continue e-Learning in the future.

The finding is consistent with previous e-Learning research where a positive relationship between self-efficacy and e-Learning continuance intention was reported (Liang et al., 2011; Park, 2009). Liang et al. studied how nurses' self-efficacy and attitudes affect web-based learning continuance and found a relationship between self-efficacy and continuance intention with a medium effect size. Park extended the TAM (Davis, 1989) to study university student intention to use e-Learning and found a similar relationship with a large effect size.

6.4.6 Indirect effects in the structural model

This section discusses the indirect effects discovered in fitting the model from the learner perspective (see Table 6.35). As discussed in section 6.3.6, the strength of an indirect effect is judged by the total effect when there is no direct effect or by the difference between the total and the direct effect when both effects are statistically significant. As differences between total and direct effects were too small to correspond to meaningful indirect effects, they are not discussed.

Table 6.35 Direct and Total Effects of Constructs in the Study from the Learner Perspective

	Effect on learner satisfaction		Effect on learner use of the e-Learning system		Effect on level of learning		Effect on learner intention to continue e-Learning	
	Direct effect	Total effect	Direct effect	Total effect	Direct effect	Total effect	Direct effect	Total effect
Quality of e-Learning content	—	—	.40	.43		.10		.14
Quality of the e-Learning system	.63	.63	—	—				.37
Learner satisfaction			.45	.45	.39	.47	.52	.63
Learner use of the e-Learning system					.17	.17	.24	.24
Learner self-efficacy			—	—			.19	.19

Note: Cells containing a dash (—) indicate lack of statistical significance ($p \geq 0.05$). Cells corresponding to pairs of constructs not connected by directed paths in the model (see Figure 6.11) were left empty.

Quality of the e-Learning content had an indirect effect on learner intention to continue e-Learning, with a small effect size. Quality of the e-Learning system had an indirect effect, with medium effect size, on quality of learner intention to continue e-Learning. As seen in Table 6.35, quality of the e-Learning system was the only influential organisational dimension, with one large direct effect size and a medium indirect effect size.

Thus, the results indicate that learner intention to continue e-Learning can be improved by boosting learner satisfaction and by encouraging learner use of the e-Learning system by improving quality of the e-Learning system, as well as by providing high quality content to learners via the e-Learning system. .

6.5 Summary

For both models, in data screening no outliers were found when testing using Mahalonobis distance at .95 confidence level. Visual normality checks using probability plots and scatter diagrams suggested that the data was close to normal.

The response rate was 30.08% in the study from the instructor perspective and 6.75% in the study from the learner perspective. For both models, no non-response bias was found when comparing early respondents with late respondents according to demographic characteristics. The respondents in the study from the instructor perspective were predominantly females 46 years old or over and highly experienced as instructors in face-to-face environment. The respondents in the study from the learner perspective were predominantly males younger than 30, most were relatively new to e-Learning, and the majority studied internally on campus.

Measurement models were analysed using PLS confirmed item reliability, internal consistency reliability, convergent validity, and discriminant validity (the only adjustment necessary was the removal of one item in the measure of quality of the institutional support to learners, in the study from the learner perspective). The overviews of structural model testing results including the amount of variance explained in dependent variables and path coefficients statistical significance and magnitudes are given in Figure 6.6 for the study from the instructor perspective and in Figure 6.11 for the study from the learner perspective. The best explained constructs were instructor satisfaction in the model from the instructor perspective (with $R^2 = .48$) and learner intention to continue e-Learning in the model from the learner perspective (with $R^2 = .62$).

The analysis of qualitative data obtained in the study from the instructor perspective revealed a range of views of the respondents, particularly focusing on aspects relating to organisational dimensions.

CHAPTER 7: CONCLUSIONS AND IMPLICATIONS

7.1 Introduction

The purpose of this research was to explore the dimensions of e-Learning systems success in an organisational context, with the focus on instructors and learners as important stakeholders. The research addressed the following questions (initially stated in section 1.3): (1) How can various facets of the concept of e-Learning system success be organised as a multidimensional framework? and (2) What are the dimensions of e-Learning systems success in an organisational context, from the instructor and from the learner perspectives?

Research question one was addressed by conducting a review of the literature related to e-Learning systems success and by formulating a framework organising the dimensions of e-Learning systems success in the organisational context suggested or implied by the literature. Then, the usefulness of the framework was demonstrated by using it as a basis for formulating two e-Learning systems success models: a model with the focus on instructors and a model with the focus on learners. The models were tested by using data collected from lecturers and students at universities in New Zealand. By formulating and testing these models, research question two was also addressed.

This chapter first provides an overview of the research, which is followed by a summary of the findings. Next, the implications of the research for theory and for practice are discussed, followed by the limitations of the research, the topics for future research, and the concluding remarks for this thesis.

The concluding remarks (in section 7.6) involve a concise statement of the contributions of this research, which are discussed in more detail, from the perspectives of theory and practice, in sections 7.4.1 and 7.4.2, respectively.

7.2 Overview of the thesis

This section restates the highlights of the thesis particularly important in addressing the research questions. Detailed summaries were provided at the ends of chapters two to six.

Chapter one stated the research problem (section 1.2) and the specific research questions (stated in section 1.3 and restated in section 7.1).

Chapter two discussed the trends in e-Learning systems success research (see section 2.3.2) derived from a systematic literature review covering journal articles in high-impact journals (the journals covered and the approach used are discussed in section 2.3.1). This was followed by a broader, unstructured review of literature related to e-Learning systems success, building on the systematic review. The insights gained in the review were summarised as a framework organising the dimensions of e-Learning systems success suggested by the literature (see Figure 2.5). In the framework, the e-Learning systems success dimensions were categorised as organisational dimensions, instructor dimensions, and learner dimensions.

Chapters three and four presented two models of e-Learning systems success that were formulated based on the framework in Figure 2.5: a model from the instructor perspective (Figure 3.2) and a model from the learner perspective (Figure 4.2). The individual hypotheses included in the two models were introduced and justified in sections 3.4 and 4.4.

Chapter five justified the use of quantitative, explanatory, correlational survey based research in addressing the research questions, along with using elements of mixed method research. The primary method chosen for this research was deductive quantitative, though elements of inductive qualitative research were also employed. The research involved conducting surveys of lecturers (instructors) and students (learners) at universities in New Zealand (within the same organisational context). The research participants were described in sections 5.3.2 and 5.3.3 and the operationalisation of constructs for the two e-Learning success models—from the instructor perspective and from the learner perspective—was discussed in sections 5.4.1 and 5.4.2, respectively. Reliability and validity of measures were discussed in section 5.6.2.

Chapter six presented the results of model testing for the model from the instructor perspective (section 6.3) and for the model from the learner perspective (section 6.4). The PLS approach was used for testing the models. For each model, the results for the measurement component were discussed separately from the results for the structural component. The outcomes for individual hypotheses were discussed in view of related results in the literature in section 6.3.5 for the model from the instructor perspective and in section 6.4.5 for the model from the learner perspective. Further insights for the model from the instructor perspective were obtained by analysing (using constant comparative method) the free-text comments provided by the respondents (see section 6.3.8).

7.3 Summary of research findings

This section summarises the findings of this research along the research questions (see section 1.3 and section 7.1). Section 7.3.1 discusses the findings for research question one, which was addressed by organising various e-Learning systems success dimensions suggested by the literature into a multidimensional framework. Section 7.3.2 discusses the findings for research question two, which was addressed by formulating and testing two e-Learning systems success models in an organisational context in the study from the instructor perspective and in the study from the learner perspective.

7.3.1 Research question one: How can various facets of the concept of e-Learning systems success be organised as a multidimensional framework?

To answer the first research question, a framework incorporating and organising the dimensions of e-Learning systems success suggested or implied by priors studies was formulated based on a literature review (see Figure 2.5). The literature review identified three themes, along which the dimensions were organised in the framework:

organisational dimensions, instructor dimensions, and learner dimensions. Out of the 13 e-Learning systems success dimensions identified in the literature, 10 were seen as related to constructs of the IS success model by DeLone and McLean (2003), with two of the dimensions (level of learning and e-Learning continuance intention) falling under the omnibus individual impact dimension in the IS success model. Some of the constructs in the IS success model were represented at more than one level, including user satisfaction (instructor satisfaction and learner satisfaction dimensions), system use (instructor use of the e-Learning system and learner use of the e-Learning system), and service quality (quality of the institutional support to instructors and learners and quality of the instructor support to learners). The finding that most of the e-Learning systems success dimensions suggested or implied by the literature matched the dimensions of the IS success model (DeLone & McLean, 2003) was unexpected because most of the literature sources covered in the review did not refer to the IS success model explicitly. Two of the three dimensions that were not analogous to the IS success model, (instructor self-efficacy and learner self-efficacy) related to the self-efficacy theory by Bandura (1997).

The three organisational dimensions were quality of the e-Learning system and quality of the institutional support to e-Learning system users (corresponding to system quality and service quality in the IS success model), as well as quality of the e-Learning development and implementation process. The quality of the e-Learning development and implementation process dimension does not match any constructs in the DeLone and McLean (2003) IS success model. This construct is related to the IS maturity category identified in a variable analysis study to examine the antecedents of information systems success (Larsen, 2003); Larsen commented that research in this category was not sufficient. The present study goes some way to address the issue highlighted by Larsen.

The usefulness of the framework was demonstrated by using it to formulate two e-Learning systems success models, a model from the instructor perspective, and a model from the learner perspective. Testing these models also addressed the second research question of the thesis, and is discussed in the following section.

The framework is based on reviewing the literature; implicitly or explicitly prior studies have been considering organizational, instructor, and learner dimensions of e-Learning systems success. The framework is a descriptive model (following the model typology by Gregor, 2006) based on such prior studies. I am not aware of any prior studies that would explicitly formulate a similar framework; therefore, I believe that the framework constitutes an original contribution to knowledge.

7.3.2 Research question two: From the instructor and from the learner perspective, what are the dimensions of e-Learning system success in an organisational context, and how do they relate to each other?

This section discusses the findings for research question two, which was addressed by formulating two e-Learning systems success models: a model from the instructor perspective and a model from the learner perspective. The models were tested with lecturers and students at New Zealand universities.

7.3.2.1 Findings of the study from the instructor perspective

The model developed for the study from the instructor perspective was discussed in detail in chapter three. The model was tested via a survey of instructors in all the colleges of education in New Zealand universities.

The measurement model analysis using the PLS technique demonstrated satisfactory reliability and validity for the measurement instruments. The explanatory power of the model was tested with structural model analysis using PLS. Based on the variance explained by the proposed research model, it was concluded that the model has satisfactory overall explanatory power. The results of the structural model analysis are discussed in detail in section 6.3.5.

Organisational dimensions. Quality of the e-Learning system and quality of the institutional support to instructors affected instructor satisfaction with e-Learning. Quality of the e-Learning system also affected the extent of instructor use of the e-Learning system. Further, quality of the e-Learning system and quality of the institutional support to instructors had an indirect effect on quality of the e-Learning content and quality of the instructor support to learners.

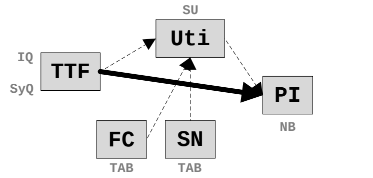
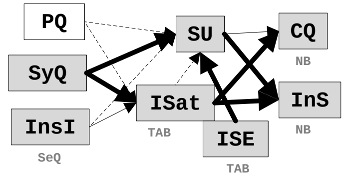
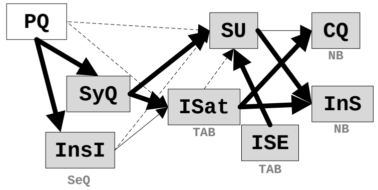
Instructor dimensions. The extent of instructor use of the e-Learning system and instructor satisfaction with e-Learning affected quality of the e-Learning content and quality of the instructor support to learners in relation to e-Learning. Further, instructor self-efficacy affected the extent of instructor use of the e-Learning system.

Qualitative findings. In free-text comments (see section 6.3.8 for the analysis of qualitative findings), the instructors primarily focused on organisational dimensions. In particular, a number of the themes discovered via constant comparative analysis of the comments related to e-Learning development and implementation process—a dimension that was not found to affect any other dimensions of the model.

7.3.2.2 Study from the instructor perspective—comparison to prior studies

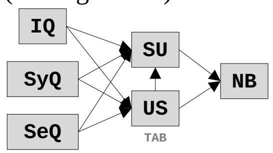
Table 7.1 compares the results for model from the instructor perspective with the results in the study by McGill et al. (2008).

Table 7.1 Study from the instructor perspective—comparison to prior studies

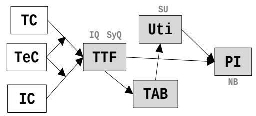
	Study	Section	Cultural context	Participants	Perspective	Model construction and testing[a]		
5	McGill et al. (2008)	2.5.2.5	Australia	University instructors	Instructors	Task-technology fit model with factors based on theories of attitude and behaviour represented by facilitating conditions (FC) and social norm (SN).		
	The present study		New Zealand	University instructors	Instructor	Based on DeLone and McLean IS success model. Added development and implementation process quality (PQ) and instructor self-efficacy (ISE). Content quality and instructor support to learners (InS) represented net benefits. Institutional support to instructors (InsI) represents service quality.	Main analysis (section 6.3.5)	
							Post hoc analysis (section 6.3.7)	

[a]Constructs related to constructs in the DeLone and McLean (2003) model are given as grey rectangles. The spatial arrangement for such constructs is held as close as possible to the geometrical arrangement used by DeLone and McLean. Constructs related to constructs by DeLone and McLean, but named differently, are labelled to make the correspondence explicit (with one exception – factors that can be seen as precursors of usage suggested by theories of attitude and behaviour, as suggested by task technology fit theory, are labelled by TAB, including the user satisfaction construct from DeLone and McLean model). Abbreviated construct names used in the diagrams are expanded in Table 2.5. Thick solid lines indicate strong and medium effects; thin solid lines indicate weak effects.

DeLone and McLean (2003) model (see Figure 2.7)



Task technology fit model (see Figure 2.8)



The study by McGill et al. (2008) based their model on the task technology model and included two factors from theories of attitudes and behaviour—facilitating conditions and social norm; none of these factors were found to have effect. In the present study, the model included two constructs that can be seen as factors from theories of attitudes and behaviour—user satisfaction and instructor self-efficacy; moreover, the institutional support to instructors construct had content similar to facilitating conditions in the model by McGill et al. In contrast with the results by McGill et al., all of these factors had effects. Instructor self-efficacy and user satisfaction had strong effects, suggesting that the difference with the results of McGill et al. is unlikely just because the size of the data set in the present study was larger; rather, the model structure in the present study fitted the data better.

The study by McGill et al. (2008) interpreted performance impact (the construct in the task technology fit model corresponding to net benefits in the model by DeLone and McLean, 2003) as performance impact for instructors in terms of perceived effect of the system on instructor effectiveness and efficiency. The present study interpreted net benefits in terms of instructor support to learners via the e-Learning system and the quality of content provided by instructors via the system to learners—two constructs describing specific behaviours with respect to the e-Learning system that are likely to be of more interest to e-Learning managers than overall instructor perceptions. The present study demonstrated differences in how instructor satisfaction and instructor use of the e-Learning system affect instructor support to learners and quality of content provided by the instructors to learners—an insight that was not possible in the model by McGill et al.

The model from the instructor perspective in the present study included e-Learning development and implementation process quality, a construct with the content focusing on the presence of feedback channels informing management on the current state of e-Learning at the organisation. The results of the post hoc analysis (presented in section 6.3.7) demonstrated that quality of the e-Learning development and implementation process has strong direct effects on system quality and institutional support to instructors, resulting in indirect effects on further dimensions of the model. Thus, the results of the present study suggest that actions taken by management to improve system quality and institutional support to instructors based on information from feedback channels have positive effects for the overall quality of the e-Learning system. Therefore, the present study contributes by adding to the model of e-Learning systems success from the instructor perspective a new, important construct at organisational level.

In terms of external validity, the present study clearly adds to the insights obtained in the study by McGill and Klobas (2008) because the present study covered multiple universities, rather than a single university. The results of the present study can be generalised with more confidence.

7.3.2.3 Findings of the study from the learner perspective

The model developed for the study from the learner perspective was discussed in detail in chapter four. Testing of the model was via a survey of students enrolled in level one IT related papers at New Zealand universities.

Similar to the study from the instructor perspective, the measurement model analysis using the PLS technique demonstrated satisfactory reliability and validity for the measurement instruments. The explanatory power of the model was tested with structural model analysis using PLS. Based on the variance explained by the proposed research model, it was concluded that the model has satisfactory overall explanatory power. The results of the structural model analysis are discussed in detail in section 6.4.5.

Organisational dimensions. Quality of the e-Learning system affected level of learner satisfaction with e-Learning. In addition, quality of the e-Learning system had an indirect effect on learner intention to continue e-Learning.

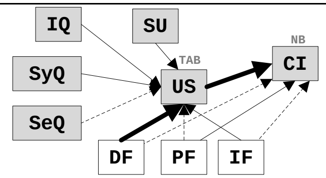
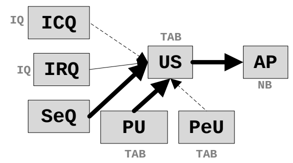
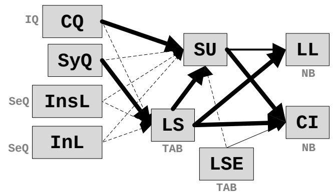
Instructor dimensions. Quality of the e-Learning content affected the level of learner use of the e-Learning system.

Learner dimensions. Learner use of the e-Learning system and the level of learner satisfaction affected the level of learning and learner intention to continue e-Learning. Also, learner satisfaction affected learner use of e-Learning system. Learner self-efficacy affected learner intention to continue e-Learning.

7.3.2.4 Study from the learner perspective—comparison to prior studies

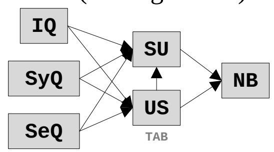
Table 7.2 compares the results for the model from the learner perspective obtained in the present study with the two similar studies that it was building on. As explained in section 2.5.3.6, none of the two prior studies distinguished institutional support to learners (generic support with using the system) from e-Learning support provided by the instructor. The present study considered institutional support to learners and instructor support to learners separately. In the study by Chiu, Chiu, et al. (2007), the content of the service quality construct was similar to system quality, and different from the support quality constructs in the present study, so that the studies are difficult to compare with respect to the effects of service quality. The difference from the study by Lee and Lee (2008) was that in the present study the leaners could obtain support face to face (and not just online), so that the support via the e-Leaning system was not as important.

Table 7.2 Study from the learner perspective—comparison to prior studies

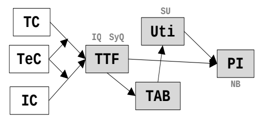
	Study	Section	Cultural context	Participants	Perspective	Model construction and testing[a]	
2	Chiu, Chiu, et al. (2007)	2.5.2.2	Taiwan	University students	Student	Based on DeLone and McLean IS success model. Added distributive fairness (DF), procedural fairness (PF), and interactional fairness (IF). Used continuance intention (CI) to represent net benefits.	
4	Lee and Lee (2008)	2.5.2.4	Korea	University students	Student	Based on DeLone and McLean IS success model. Interpreted information quality as information contextual quality (ICQ) and information representational quality (IRQ). Academic performance (AP) represented net benefits.	
5	The present study		New Zealand	University students	Student	Based on DeLone and McLean IS success model. Level of learning (LL) and Intention to continue e-Learning (CI) represented net benefits. Institutional support to learners (InsL) and instructor support to learner (InL) represented service quality. Added learner self-efficacy (LSE).	

[a]Constructs related to constructs in the DeLone and McLean (2003) model are given as grey rectangles. The spatial arrangement for such constructs is held as close as possible to the geometrical arrangement used by DeLone and McLean. Constructs related to constructs by DeLone and McLean, but named differently, are labelled to make the correspondence explicit (with one exception – factors that can be seen as precursors of usage suggested by theories of attitude and behaviour, as suggested by task technology fit theory, are labelled by TAB, including the user satisfaction construct from DeLone and McLean model). Abbreviated construct names used in the diagrams are expanded in Table 2.5. Thick solid lines indicate strong and medium effects; thin solid lines indicate weak effects.

DeLone and McLean (2003) model (see Figure 2.7)



Task technology fit model (see Figure 2.8)



System quality in the present study had strong effect on learner satisfaction; in construct, in the study by Chiu, Chiu, et al. (2007) system quality had weak effect. The study by Lee and Lee (2008) did not include system quality in their model.

The model from the learner perspective in the present study interpreted net benefits in the DeLone and McLean model (2003) as level of learning and e-Learning continuance intention. The study by Lee and Lee (2008) included academic performance in terms of grades—less important variable, as net benefits of learning are clearly broader than grades. The present study was the first to explore simultaneously the effects of learner satisfaction with the e-Learning system and of use of the e-Learning system on level of learning and on e-Learning continuance intention.

The present study was the first to formulate and to validate an e-Learning systems success model based on the DeLone and McLean IS success model (2003) in New Zealand (and, more broadly, in a cultural setting with low power distance). (Recently, results of similar studies in similar cultural contexts have been reported, see section 2.5.3). Nonetheless, because the model used in the present study differed from models used in similar prior studies conducted in cultural settings with higher power distance (Korea and Taiwan), and because, unlike in these prior studies, learners could interact with the instructors both face to face and online, it is difficult to identify the differences in the results that could be attributed to differences in the cultural setting.

7.3.3 Overall findings in relation to organisational dimensions affecting instructor and learner dimensions

This section provides a summary of findings in relation to organisational dimensions affecting instructor and learner dimensions in both studies (excluding indirect effects of organizational dimensions via other organizational dimensions). Quality of the e-Learning system had a direct effect on both instructor and learner satisfaction. Quality of the e-Learning system also affected the extent of instructor use of the e-Learning system.

Quality of the e-Learning system had an indirect effect on quality of the e-Learning content developed by the instructor and on quality of the instructor support provided to learners. Quality of the e-Learning system also had an indirect effect on learner intention to continue e-Learning in the learner model. The statistically significant findings involving organisational dimensions are presented in Table 7.3.

Table 7.3 Statistically Significant Effects Involving Organisational Dimensions

Organisational dimension	Dimensions affected	
	Study from the instructor perspective	Study from the learner perspective
Quality of the institutional support to system users	Instructor satisfaction	
Quality of the e-Learning system	Instructor satisfaction Instructor use of the e-Learning system Quality of the e-Learning content Quality of the instructor support to learners	Learner satisfaction Learner intention to continue e-Learning

Note: Both direct and indirect effects are covered, excluding indirect effects of organizational dimensions via other organizational dimension. Significance at $p < .05$.

Most of the themes identified in constant comparative analysis of free-text comments entered by the instructors related to organisational analysis. The themes are listed in Table 7.4 (refer to section 6.3.7 for the detailed analysis).

Table 7.4 Themes Related to Organisational Dimensions Identified in Instructor Comments

Organisational dimension	Related themes
e-Learning development and implementation process	Instructor involvement Institutional policy limitations Forced lack of face-to-face contact Frustrations with workload and hours Institution-wide success Organisational leadership
Institutional support to instructors	Institutional support giving instructors confidence Instructor e-Learning experience giving confidence Perceived lack of support
Quality of the e-Learning system	Reliability Usability and accessibility System quality versus instructor capability

7.4 Implications of the research

To recapitulate the main findings (described in more detail in section 7.3), the study formulated a framework structuring the organisational, instructor, and learner dimensions of e-Learning systems success. The validity of the framework was tested by formulating and testing two e-Learning systems success models—from the instructor and the learner perspectives.

The results of testing the model from the instructor perspective (see Figure 6.6) suggested that quality of the e-Learning content and quality of the instructor support to students are affected by instructor use of the e-Learning system and by instructor satisfaction by the e-Learning system. Quality of the e-Learning system (an organizational dimension) affects both instructor use of the e-Learning system (which is also affected by instructor self-efficacy with respect to using the system) and instructor satisfaction. In contrast, quality of the institutional support to instructors (another organizational dimension) affects only instructor satisfaction (with the effect size that is weaker than the one for e-learning system quality). Quality of the e-Learning development and implementation process (one more organizational dimension, operationalized in the present study by emphasizing the use of student and instructor feedback to make improvements) does not affect any of the instructor dimensions directly, but does affect the remaining two organizational dimensions—the quality of the institutional support to instructors and the quality of the e-Learning system; as the result, quality of the e-Learning development and implementation process has indirect effects on instructor satisfaction, instructor use of the e-Learning system, quality of the e-Learning content, and quality of the instructor support to learners. Overall, the most influential organizational dimension is the quality of the e-Learning system. Considerable amount of variance in the two instructor dimensions that have direct implications for the learners' e-Learning experience—quality of the e-Learning content and quality of the instructor support to students—was explaned by the model, even though all effects on them were hypothesised to be mediated by just two other instructor dimensions—instructor use of the e-Learning system and instructor satisfaction. Quality of the e-Learning content and quality of the instructor support to students can be seen as outcome variables in the model from the instructor perspective.

The results of testing the model from the learner perspective (see Figure 6.11) suggested that only relatively small amount of variance in the level of learning is predicted by the model (this was, most likely, because leaners who participated in the present study mostly learned in face-to-face with the instructos). Learner intention to continue e-Learning was predicted better. These two dimensions (which can be seen as outcome variables, outcomes of learner use of the system) are affected by learner use of the e-Learning system and learner satisfaction (with the intention to continue e-Learning also affected by learner self-efficacy). The only instructor dimension found to have effect was quality of the e-Learning content, and the only organisational dimension found to have effect was quality of the e-Learning system. (It appears that the use of the e-Learning system was mainly limited to providing content, resulting in the quality of instructor support via the system having no effect.)

7.4.1 Implications for theory

The study's framework structuring the organisational, instructor, and learner dimensions of e-Learning systems success (as suggested or implied in the literature) can be used as a basis for formulating e-Learning systems success models for specific contexts. The framework was validated by using it to formulate two models (from the instructor and from the learner perspective, both found to explain considerable amounts of variance in important outcome variables).

The study identified quality of the e-Learning development and implementation process as a dimension of e-Learning systems success. This study was the first to formulate and to test a measure for e-Learning development and implementation process. An insight into the instructor views of this dimension was obtained by qualitative analysis of their free-text comments. Even though qualitative findings suggested the importance of quality of the e-Learning development and implementation process, quantitative results from testing the model of e-Learning systems success from the instructor perspective suggested that it does not affect the instructor dimensions of e-Learning systems success directly, but only via other organizational dimensions.

The study was the first to formulate and to test a multidimensional e-Learning systems success model based on DeLone and McLean's (2003) IS success model focusing on instructors as the stakeholders.

The study contributed to further validation and refinement of a broad range of measurement scales for constructs corresponding to the dimensions of e-Learning systems success. This was achieved by conducting a content validity survey with e-Learning experts—the first such study for all of the measures included in the e-Learning systems success framework.

The study investigated the effect of organisational dimensions on other dimensions of e-Learning systems success, accounting for instructor and learner perspectives in the same organisational context. The quality of the e-Learning system was highlighted as the most organizational dimension (from both the instructor and the learner perspectives).

7.4.2 Implications for practice

The model of e-Learning systems success from the instructor perspective formulated and tested in this research will be of interest to managers involved in implementing e-Learning within organisations. In particular, the model involves both the organisational dimensions, and the dimensions representing net benefits in terms of the quality of content provided to students and the quality of instructor support to students. Moreover, managers will draw insight into the meaning of the organisational dimensions to instructors from the qualitative data analysis findings.

This research was the first study of its kind in the context of New Zealand universities. Therefore, this research provided meaningful insights particularly relevant to e-Learning managers and practitioners in New Zealand.

By combining the results from the instructor and from the learner perspective, one can describe the interactions between different dimensions of e-Learning systems success at organisations as follows. Top management uses a range of feedback channels to gauge the state of e-Learning at the organisation. The management initiates changes to organisation level technology and support services to improve system quality and support to instructors, resulting in higher instructor satisfaction and in greater use of the available e-Learning features. Higher instructor satisfaction and greater use of the available e-Learning features result in better quality of content and in better instructor support to students via the e-Learning system. For students that are involved in blended learning and thus can receive support face to face, better quality of content provided by the instructors and better system quality result in both higher satisfaction and in greater use of the system; learner satisfaction with the system and greater use of the system contribute to further use of e-Learning, and, most importantly, to the level of learning attained.

In terms of specific recommendations to e-Learning managers, the results suggest that it is important to have high quality e-Learning development and implementation process that would enable managers to continuously assess the state of e-Learning at the organisation, and that information and feedback relating to the use of the e-Learning system enable managers to improve system quality—the variable at the organisational level that had the strongest effect on both instructors and learners.

The results of the present study suggest the following steps that managers can take to improve the quality of e-Learning systems at organisations:

- Continuously evaluate the state of e-Learning at the organisation. Employ multiple instruments to measure educational effectiveness of the e-Learning system, such as surveys and focus groups. Take into account the feedback from the instructors and involve the instructors early in the development of educational programs making use of e-Learning.
- Provide good quality support to the instructors, both in terms of technical support and in terms of promoting good instructional practices in using e-Learning.
- Focus in particular on the quality of the e-Learning system (even more, than on providing support to the instructors). Ensure that the system is reliable and robust, provides the functionality the instructors need, is easy to use, and can be

accessed via high speed networks that both instructors and the learners have access to (on premises and off premises).

- Hire instructors that are confident in using information technology in general and e-Learning tools in particular. Promote greater levels of confidence by providing training.
- When leaning happens both face-to-face and via the e-Learning system, emphasize to the instructors the importance of providing high quality e-Learning content to the learners. Provide sufficient funds to enable the instructors to ackquire high quality e-Learning materials for deployment via the e-Learning system, such as videos, on-line quizzes, and on-line simulation software.
- Encourage the learners' use of the e-Learning system by offering access terminals throughout the organization, at locations such as the library or at spots where leaners frequently assemble, such as near bus terminals. Ensure that reliable wireless access is available thoughout the organization, and ensure that learners that do not own suitable mobile devices (such as tablets) can rent such devices easily and inexpensively.
- Enhance learners' confidence in using the e-Learning system by providing orientation sessions and by encouraging peer support.

7.5 Limitations of the research and implications for further research

The participants were lecturers at colleges of education and students enrolled in introductory information technology papers in New Zealand universities. Most of the lecturers were highly experienced and female. Most of the student participants had just started using e-Learning. Care should be taken when generalising the results of the study to populations with different characteristics. Moreover, the response rate in the study from the learner perspective was low (even though it was comparable with similar studies reported in the literature). The findings of the study from the instructor perspective should be seen as more robust than the findings of the study from the learner perspective.

The cross-sectional survey design employed in this study provides no empirical evidence distinguishing causes from effects. For example, instructor self-efficacy can be justifiably hypothesised as affecting instructor use of the e-Learning system and instructor satisfaction (as it was done in this study). Nevertheless, the effect in the opposite direction can also be justified.

A major earthquake occurred in Christchurch, New Zealand during the survey period in September 2010. According to comments received from some of the potential respondents, this affected the response rate to a certain extent in both the instructor and the learner surveys. Nonetheless, because the earthquake was never mentioned in free-text comments by the instructors, the effect of the event on generalisability of the findings is likely to be negligible.

In future research, it would be of interest to complement the findings of this research by conducting a multiple case study involving instructors and the learners they are responsible for, resulting in a true multilevel design. The findings of this study could be used to formulate criteria for case selection. It would be of particular interest if such a multiple case study employed a longitudinal design, thus resulting in direct empirical evidence distinguishing causes and effects.

The study by McGill, Hobbs, and Klobas (2003) explored the success of end user developed applications. Arguably, course materials created by instructors are also end user developed applications, because instructors are not professional programmers or digital artists. McGill, Hobbs, and Klobas demonstrated the relevance of exploring if end user developers are satisfied with their own creations and intend to use them, with such satisfaction and behavioural intention ultimately resulting in positive net outcomes. The present study did not address instructor attitudes to their own work; it is desirable that this aspect is explored in future research.

7.6 Concluding remarks

Based on the literature, this study formulated a framework organising various facets of e-Learning systems success and validated it by formulating and testing two e-Learning systems success models, from instructor and student perspectives.

This study was the first to test a measure for quality of the e-Learning development and implementation process construct. Nonetheless, the quality of the e-Learning development and implementation process affected instructor dimensions only indirectly. From the point of view of affecting instructor dimensions, the most influential organisational dimension in this research was quality of the e-Learning system.

The model of e-Learning systems success from the instructor perspective formulated and tested in this research, along with the associated qualitative findings, will be of interest to e-Learning managers.

REFERENCES

Abdous, M., & Yoshimura, M. (2010). Learner outcomes and satisfaction: A comparison of live video-streamed instruction, satellite broadcast instruction, and face-to-face instruction. *Computers & Education, 55*(2), 733-741.

Adeyinka, T., & Mutula, S. (2010). A proposed model for evaluating the success of WebCT course content management system. *Computers in Human Behavior, 26*(6), 1795–1805.

Adobe Connect. http://www.adobe.com/nz/products/adobeconnect/elearning.html. Retrieved November 2012, from Adobe Connect web site.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In Kuhl, J. and Beckmann, J. (Eds,), *Action-control: From cognition to behaviour* (pp. 11-39), Heidelberg: Springer,

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Alavi, M., (1994). Computer-mediated collaborative learning: An empirical evaluation. *MIS Quarterly, 18*(2), 159-174.

Al-Busaidi1, K. A., Olfman, L., Ryan, T., & Leroy, G. (2010). Sharing Knowledge to A Knowledge Management System: Examining the motivators and the benefits in an Omani organization. *Journal of Organizational Knowledge Management*, 1-12.

Almekhlafi, A. G., & Almeqdadi, F. A. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology & Society*, *13* (1), 165–175.

Al-Qirim, N. (2007). The adoption of e-Commerce communications and applications technologies in small businesses in New Zealand. *Electronic Commerce Research and Applications*, *6*(4), 462-473.

Anderson, T. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1-17.

Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with internet-based MBA courses. *Journal of Management Education, 24*(32), 32-54.

Arbaugh, J. B. (2001). How instructor immediacy behaviour affect student satisfaction and learning in web-based courses. *Business Communication Quarterly*, *24*(42), 42-54.

Arbaugh, J. B. (2002). Managing the on-line classroom: A study of technological and behavioural characteristics of web-based MBA courses. *The Journal of High Technology Management Research*, *13*(2), 203-223.

Artino, A. R. (2007). Online military training: Using a social cognitive view of motivation and self-regulation to understand students' satisfaction, perceived learning, and choice. *The Quarterly Review of Distance Education*, *8*(3), 191–202.

Artino, A. R. (2009). Online learning: Are subjective perceptions of instructional context related to academic success. *The Internet and Higher Education, 12*(3-4), 117-125.

Artino**,** A. R. (2010). Online or face-to-face learning? Exploring the personal factors that predict students' choice of instructional format. *The Internet and Higher Education*, *13*(4), 272-276.

Artino, A. R., & McCoach, D. B. (2008). Development and initial validation of the online learning value and efficacy scale. *Journal of Educational Computing Research*, *38*(3), 279−303.

Artino, A. R., La Rochelle, J. S., & Durning, S. J. (2010). Second-year medical students' motivational beliefs, emotions, and achievement. *Medical Education, 44*, 1203–1212.

Auckland University. http://www.courses.business.auckland .ac.nz/CoursePdfs /INFOSYS110.pdf. Retrived in November, 2012 from the Auckland University.

Bailey, J. E., & Pearson, S.W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management Science, 29*(5), 530–545.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. New Jersey: Englewood Cliffs-Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

Baroudi, J. J., Olson, M. H., & Ives, B. (1986). An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM*, *29(3),* 232-238.

Behrens, S., Jamieson, K., Jones, D., & Cranston, M. (2005). Predicting system success using the technology acceptance model: A case study. *16th Australasian Conference on Information Systems,* Sydney.

Berghout, E. (2012). *Leading issues in ICT evaluation* (1st ed.). United Kindom: Goodnewsdigitalpress.

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly, 25*(3), 351-370.

Biasutti, M. (2011). The student experience of a collaborative e-Learning university module. *Computers & Education, 57*(3), 1865-1875.

Blackboard. http://www.blackboard.com. Retrieved November 2012, from Blackboard web site.

Blooms, B. J. (1956). *Taxonomy of educational objectives; the classification of educational goals, by a committee of college and university examiners* **(**1st ed.). New York: Longmans Green.

Bokhari, R. H. (2005). The relationship between system usage and user satisfaction: a meta-analysis. *The Journal of Enterprise Information Management, 18*(2), 211-234.

Bolliger, D. U., & Wasilik, O. (2009). Factors influencing faculty satisfaction with online teaching and learning in higher education. *Distance Education, 30*(1), 103-116.

Brown, M., Anderson, B., & Murray, F. (2007). E-learning policy issues: Global trends, themes and tensions. In ICT: Providing choices for learners and learning. *Proceedings ascilite*, Singapore. Downloaded from http://www.ascilite.org.au/ conferences/singapore 07/procs/brown-m.pdf.

Brown, S. P., & Chin, W. W. (2004). Satisfying and retaining customers through independent service representatives. *Decision Sciences, 35*(3), 527-550.

Caprara, G. V., Barbaranelli, C., & Steca, B. P. (2006). Teachers' self-efficacy beliefs as determinants of job satisfaction and students' academic achievement: A study at the school level. *Journal of School Psychology, 44*(6), 473-490.

Carswell, A. D., & Venkatesh, V. (2002). Learner outcomes in an asynchronous distance education environment. *International Journal of Human-Computer Studies, 56*(4), 475-494.

Cenfetelli, R. T., Benbasat, I., & Al-Natour, S. (2008). Addressing the what and how of online services: positioning supporting-services functionality and service quality for business-to-consumer success. *Information Systems Research, 19*(2), 161-181.

Chan, S. W. (2009). The roles of user motivation to perform a task and decision support system (DSS) effectiveness and efficiency in DSS use. *Computers in Human Behavior, 25*(1), 217-228.

Chang, S. C., & Tung, F. C. (2008). An empirical investigation of students' behavioural intentions to use the online learning course websites. *British Journal of Educational Technology, 39*(1), 71–83.

Charmaz, K. (2006). *Constructing grounded theory: a practical guide through qualitative analysis*. London: SAGE publications.

Chatzoglou, P. D., Sarigiannidis, L., Vraimaki, E., & Diamantidis, A. (2009). Investigating Greek employees' intention to use web-based training. *Computers & Education, 53*(3), 877-889.

Chen, C. Y., Chang, R. E., Hung, M. C., & Lin, M. H. (2009). Assessing the quality of a web-based learning system for nurses. *Journal of Medical Systems*, *33*(4), 317-325.

Chen, H. J. (2012). Clarifying the empirical connection of new entrants' e-learning systems use to their job adaptation and their use patterns under the collective–individual training environment. *Computers & Education, 58*(1), 321-337.

Chen, R. J. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning. *Computers & Education*, *55*(1), 32-42.

Chen, W. S., & Hirschheim, R. (2004). A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information Systems Journal*, *14*(3), 197-235.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, Retrieved from http://learningcommons. evergreen.edu/pdf/Fall1987.pdf.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum.

Chin, W. W., Marcolin, B., & Newsted, P. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research*, *14*(2), 189–217.

Chiu, C. M., & Wang, T. G. (2008). Understanding web-based learning continuance intention: The role of subjective task value. *Information & Management*, *45*(3), 194-201.

Chiu, C. M., Chiu, C. S., & Chang, H. C. (2007). Examining the integrated influence of fairness and quality on learners' satisfaction and web-based learning continuance intention. *Information Systems Journal*, *17*(3), 271-287.

Chiu, C. M., Hsu, M. H., Sun, S. Y., Lin, T. C., & Sun, P. C. (2005). Usability, quality, value and e-Learning continuance decisions. *Computers & Education*, *45*(4), 399-416.

Chiu, C. M., Sun, S. Y., Sun, P. C., & Ju, T. L. (2007). An empirical analysis of the antecedents of web-based learning continuance. *Computers & Education*, *49*(4), 1224-1245.

Chiva, R., & Alegre, J. (2008). Emotional intelligence and job satisfaction: the role of organizational learning capability. *Personnel Review*, *37*(6), 680-701.

Chou, S., & Liu, C. (2005). Learning effectiveness in a web-based virtual learning environmental learner control perspective. *Journal of Computer Assisted Learning, 21*(1), 65-76.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). New Jersey: Lawrence Erlbaum Associates.

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*(5), 678–707.

Compeau, D., Higgins, C. A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS Quarterly, 23*(2), 145–158.

Condie, R., & Livingston, K. (2007). Blending online learning with traditional approaches: changing practices. *British Journal of Educational Technology, 38*(2), 337–348.

Cooper, D. (2006). *Business Research Methods* (9th ed.). New York: McGraw Hill Companies Inc.

Coppola, N. W., Hiltz, S. R., & Rotter, N. G. (2002). Becoming a virtual professor: pedagogical roles and asynchronous learning networks. *Journal of Management Information Systems, 18*(4), 169-189.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. California: Sage Publications.

Creswell, J. W., & Clark, V. L. P. (2010). *Designing and conducting mixed methods research*. Los Angeles: SAGE Publications.

Crumpacker, N. (2003). Faculty pedagogical approach, skill, and motivation in today's distance education milieu. *Online Journal of Distance Learning Administration, 4*(4). Retrieved from http://www.westga.edu/~distance/ojdla/winter44/ crumpacker44.html.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-339.

Davis, F. D., & Venkatesh, V. (1996). A critical assessment of potential measurement biases in the technology acceptance model: three experiments. *International Journal of Human-Computer Studies, 45*(1), 19-45.

De Vaus, A. (2002). *Analyzing social science data*. London: SAGE publications.

Deepwell, F. (2007). Embedding quality in e-Learning implementation through evaluation. *Educational Technology & Society, 10*(2), 34-43.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60-95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9-30.

Dennen, V., Darabi, A. A., & Smith, L. J. (2007). Instructor-learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28*(1), 65-79.

Dishaw, T. M., & Strong, D. M. (1999). Extending the technology acceptance model with task–technology fit constructs. *Information & Management, 36*(1), 9-21.

Doll, W. J., & Torkzadeh, G. (1988). The measurement of the end user computer satisfaction. *MIS Quarterly, 12*(2), 259-274.

Durucu, M., & Calisir, F. (2009). Factors affecting faculty members' integration of electronic communication in teaching. *Proceedings of the 2009 Industrial Engineering and Engineering Management*, 1998-2002.

Easton, S. S. (2003). Clarifying the instructor's role in online distance learning. *Communication Education, 52*(2), 87-105.

Eccles J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectations, values, and academic behaviours. In J.T. Spence (ed.). *Achievement and achievement motivation* (pp. 75-146). San Francisco: W.H. Freeman.

Eom, B. S., Wen, H. J., & Ashill, N. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. *Decision Sciences Journal of Innovative Education, 4*(2), 215-235.

Falk, R. F., & Miller, N. B. (1992). *A primer for soft modelling*. Akron, OH: University of Akron Press.

Faseyitan, S., Libii, J. N., & Hirschbuh, J. (1996). An in service model for enhancing faculty computer self-efficacy. *British Journal of Educational Technology, 27*(3), 214–226.

Feather, N. T. (1975). *Values in education and society*. New York: Free Press.

Ferguson, J. M., & DeFelice, A. E. (2010). Length of online course and student satisfaction, perceived learning, and academic performance. *International Review of Research in Open and Distance Learning, 11*(2), 73-84.

Fleming, C. M., & Bowden, M. (2009). Web-based surveys as an alternative to traditional mail methods. *Journal of Environmental Management, 90*(1), 284–292.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Franklin, C. (2007). Factors that influence elementary teachers' use of computers. *Journal of Technology and Teacher Education, 15*(2), 267–293.

Fredericksen, E., Pickett, A., Pelz, W., Shea, P., & Swan, K. (2000). Student satisfaction and perceived learning with online courses: principles and examples from the SUNY Learning Network. *Journal of Asynchronous Learning Networks, 4*(2), 7-28.

Freeze, R. D., Alshare, K. A., Lane, P. L., & Wen, H. J. (2010). IS success model in e-Learning context based on students' perceptions. *Journal of Information Systems Education, 21*(2), 173-184.

Gamage, V., Tretiakov, A., & Crump, B. (2011). Teacher perceptions of learning affordances of multi-user virtual environments. *Computers & Education, 57*(4), 2406-2413.

Gatian, A. W. (1994). Is user satisfaction a valid measure of system effectiveness. *Information & Management, 26*(3), 119-131.

Gefen, D., & Straub, D. W. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems, 4*(1), 1-77.

George-Walker, L., D., & Keeffe, M. (2010). Self-determined blended learning: a case study of blended learning design. *Higher Education Research & Development, 29*(1), 1-13.

Gilbert, J., Morton, S., & Rowley, J. (2007). e-Learning: the student experience. *British Journal of Educational Technology, 38*(4), 560-573.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory*. New York: Aldine Publishing Company.

Global Industry Analysts, Inc. (2010). e-Learning: a global strategic business report. Retrieved from http://www.strategyr.com/pressMCP-4107.asp.

Goles, T., & Hirschheim, R. (2000). The paradigm IS dead, the paradigm is dead . . . long live the paradigm: the legacy of Burrell and Morgan. *Omega*, *28*(3), 249–268.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213-236.

Godhue, D., Lewis, W., & Thompson, R. (2006). PLS, small sample size and statistical power in MIS research. *Proceedings of the 39th Hawaii International Conference on System Sciences*, In R. Sprague (ed.), Los Alamitos, CA: IEEE Computer Society Press.

Govindasamy, T. (2002). Successful implementation of e-Learning: pedagogical considerations. *The Internet and Higher Education, 4*(3–4), 287–299.

Grandcolas, U., Rettie, R., & Marusenko, K. (2003). Web survey bias: Sample or mode effect. Journal of Marketing Management, *19*(5/6), 541-561.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis: a global perspective* **(**7th ed.), New Jersey: Pearson Education.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory & Practice, 19*(2), 139-152.

Hamilton, S., & Ives, B. (1982). Knowledge Utilization among MIS Researchers. *MIS Quarterly, 6*(4), 61-77.

Hammoud, L., Love, S., & Brinkman, W. P. (2008). The affect of lecturers' attitude on students' use of an online learning environment. *Proceedings of the 15th European Conference on Cognitive E*rgonomics, Retrived from http://dl.acm.org/ citation.cfm?id=1473057

Hansmann, K.W., Ringle, C.M. (2004). *SmartPLS Manual.* Germany: University of Hamburg.

Henseler, J, Ringle, C., & Sinkovics, R. (2009). The use of partial least square path modelling in international marketing. *Advance in International Marketing*, *20*, 277-319.

Hofstede, G., & Bond, M. H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational Dynamics, 16*(4), 5-21.

Holsapple, C. W., & LeePost, A. (2006). Defining, assessing, and promoting e-Learning success: An information systems perspective. *Decision Sciences Journal of Innovative Sciences, 4*(1), 67-85.

Hong, K. S. (2002). Relationships between students' and instructional variables with satisfaction and learning from a Web-based course. *The Internet and Higher Education, 5*(3), 267-281.

Howell, S. L., Saba, F., Lindsay, N. K., & Williams, P. B. (2004). Seven strategies for enabling faculty success in distance education. *The Internet and Higher Education, 7*(1), 33–49.

Hsu, W. K., & Huang, S. S. (2006). Determinants of computer self-efficacy: An examination of learning motivations and learning environments. *Journal of Educational Computing Research, 35*(3), 245–265.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal 20*(2), 195–204.

Hussey, J., & Hussey, R. (1997). *Business research*. Whiltshire: Antony Rowe Ltd.

Hwang, Y. J., & Yi, M. Y. (2002). Predicting the use of web-based information systems: intrinsic motivation and self-efficacy. *Eighth Americas Conference on Information Systems*, 1076-1081.

Igbaria, M., Zinatelli, N., Cragg, P., & Cavaye, A. L. M. (1997). Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly, 21*(3), 279-305.

ISI social science journal citation report (2008). Retrieved from http://thomsonreuters.com/ products_services/science/science_products/a-z/journal_citation_reports.

Jang, S. J. (2010). Integrating the interactive whiteboard and peer coaching to develop the TPACK of secondary science teachers. *Computers & Education, 55* (4), 1744-1751.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30,* 199-218.

Jennex, M. E., & Olfman, L. (2004). Assessing knowledge management success, effectiveness model, *40th Hawaii International conference on System Sciences*, 1-10.

Johnson, R.D., Hornik, S., & Salas, E. (2008). An empirical examination of factors contributing to the creation of successful e-Learning environments. *International Journal of Human-Computer Studies, 66*(5), 356-369.

Joo, Y. J., Bong, M., & Choi, H. J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and internet self-efficacy in web-based instruction. *Educational Technology Research and Development*, *48*(2), 5-17.

Judge, T. A., Bono, J. E., Liang, T., & Doong, H. (2001). Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology, 86*(1), 80-92.

Kagima, L. K., & Hausafus, C. O. (2000). Integration of electronic communication in higher education: Contributions of faculty computer self-efficacy. *The Internet and Higher Education, 2*(4), 221–235.

Kao, C. P., & Tsai, C. C. (2009).Teachers' attitudes toward web-based professional development, with relation to Internet self-efficacy and beliefs about web-based learning. *Computers & Education*, *53*(1), 66-73.

Kaplan, B., & Maxwell, J. (2005). Qualitative research methods for evaluating computer information systems. *Health Informatics,* Part I, 30-55.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre- and post-adoption beliefs. *MIS Quarterly, 23*(2), 183-213.

Kettinger, W. J., & Lee, C. C. (1999), Replication of measures in information systems research: The case of IS SERVQUEL. *Decision Sciences, 30*(3), 893-899.

Kettinger, W.J., & Lee, C. C. (1994). Perceived service quality and user satisfaction with the information services function. *Decision Sciences, 25*(5), 737–766.

Kettinger, W.J., & Lee, C. C. (1997). Pragmatic perspectives on the measurement of information systems service quality. *MIS Quarterly, 21*(2), 223–240.

Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management Science, 51*(5), 741-755.

Kinzie, M. B. (1990). Requirements and benefits of effective interactive instruction: Learner control, self-regulation, and continuing motivation. *Educational Technology Research and Development*, *38*(1), 5-21.

Kitchenham, B., Budgen, D., Brereton, P., & Woodall, P. (2005). An investigation of software engineering curricula. *Journal of Systems and Software, 74*(3), 325-335.

Kiteley, R. J., & Ormrod, G. (2009). Towards a team-based, collaborative approach to embedding e-Learning within undergraduate nursing programmes. *Nurse Education Today, 29*(6), 623–629.

Klemenc-Ketis, Z., Hladnik, Z., Rotar-Pavlic, D., Post, M., & Kersnic, J. (2010). Self-reported chronic conditions in student population in Slovenia. *Zdravniski Vestnik Slovene Medical Journal, 79,* 31-41.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: Guilford Press.

Kotaniemi, J., Hassi, J., Kataja, M., Jonsson, L., Laitinen, L. A., Anssi, R. A., & Lundback, S. B. (2001). Does non-responder bias have a significant effect on the results in a postal questionnaire study. *European Journal of Epidemiology*, *17*(9), 809-817.

Kumar, R. (2005). *Research Methodology: A step-by-step guide for beginners* (2nd ed.). London: Sage Publications Ltd.

Landrum, H., & Prybutok, V. R. (2004). A service quality and success model for the information service industry. *European Journal of Operational Research, 156*(3), 628-642.

Larsen, K. R. T. (2003). A taxonomy of antecedents of information systems success: Variable analysis studies. *Journal of Management Information Systems, 20*(2), 169-246.

Larsen, T. J., Sørebø, A. M., & Sørebø, O. (2009). The role of task-technology fit as users' motivation to continue information system use. *Computers in Human Behavior 25* (3) 778‑784.

Lau, S. H. & Woods, P. C. (2009). Understanding learner acceptance of learning objects: The roles of learning object characteristics and individual differences. *British Journal of Educational Technology, 40*(6), 1059–1075.

Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology, 28*(4), 563-575.

Lee, B. C., Yoon, J. O., & Lee, I. (2009). Learners' acceptance of e-Learning in South Korea: Theories and results. *Computers & Education, 53*(4), 1320-1329.

Lee, G., & Lin, H. (2005). International customer perceptions of e-service quality in online shopping. *Journal of Retail & Distribution Management, 33*(2), 161-176.

Lee, H. J., & Rha, I. (2009). Influence of structure and interaction on student achievement and satisfaction in web-based distance learning. *Educational Technology & Society, 12*(4), 372–382.

Lee, H., Lee, Y., & Yoon, D. (2000). The determinants of perceived service quality and its relationship with satisfaction. *Journal of Services Marketing, 14*(3), 217-231.

Lee, J. (2001). Instructional support for distance education and faculty motivation, commitment, and satisfaction. *British Journal of Educational Technology, 30*(2), 153-160.

Lee, J., & Lee, W. (2008). The relationship of e-Learner's self-regulatory efficacy and perception of e-Learning environmental quality. *Computers in Human Behaviour, 24*(1), 32-47.

Lee, M. C. (2010). Explaining and predicting users' continuance intention toward e-Learning: An extension of the expectation–confirmation model. *Computers & Education, 54*(2), 506-516.

Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of Internet-based learning medium: The role of extrinsic and intrinsic motivation. *Information & Management, 42*(8), 1095-1104.

Lee, Y. C. (2006). An empirical investigation into factors influencing the adoption of an e-Learning system. *Online Information Review, 30*(5), 517-541.

Lee, Y. C. (2008). The role of perceived resources in online learning adoption. *Computers & Education, 50*(4), 1423-1438.

Leech, N. L., & Onwuegbuzie, A. J. (2009). A typology of mixed methods research designs. *Quality & Quantity*, *43*(2), 265-275.

LeePost, A. (2009). e-Learning success model: an information systems perspective. *Electronic Journal of e-Learning, 7*(1), 61-70.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40*(3), 191-204.

Levy, Y. (2006). *Assessing the value of e-Learning systems*. London: Idea Group Incorporation.

Lewis, B. R., Templeton, G., & Byrd, T. A. (2005). A methodology for construct development in MIS research. *European Journal of Information Systems, 14*(4), 388-400.

Liang, J. C., & Wu, S. H. (2010). Nurses’ motivations for web-based continuing learning and the role of Internet self-efficacy. *Innovations in Education and Teaching International*, *47*(1), 25–37.

Liang, J. C., Wu, S. H., & Tsai, C. C. (2011). Nurses' Internet self-efficacy and attitudes toward web-based continuing learning. *Nurse Education Today, 31*(8), 768-773.

Liao, H. L., & Lu, H. P. (2008). The role of experience and innovation characteristics in the adoption and continued use of e-Learning websites. *Computers & Education, 51*(4), 1405-1416.

Liaw, S. S. (2008). Investigating students’ perceived satisfaction, behavioural intention, and effectiveness of e-Learning: A case study of the Blackboard system. *Computers and Education, 51*(2), 864-873.

Liaw, S. S., Huang, H. M., & Chen, G. D. (2007). Surveying instructor and learner attitudes toward e-learning. *Computers & Education, 49*(4), 1066-1080.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly, 31*(4), 705-737.

Lin, H. (2007). Measuring online learning system success: Applying the updated DeLone and McLean model. *Cyber Psychology & Behavior, 10*(6), 817-820.

Lin, H. F., & Lee, G. G. (2006). Determinants of success for online communities: An empirical study. Behaviour and Information Technology, 25(6), 479-488.

Lin, W. S., & Wang, C. H. (2011). Antecedences to continued intentions of adopting e-Learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers & Education*, *58*(1), 88–99.

Lin, Y. M., Lin, G. Y., & Laffey, J. M. (2008). Building a social and motivational framework for understanding satisfaction in online learning. *Journal of Educational Computing Research*, *38*(1), 1-27.

Liu, S. H., Liao, H. L., & Peng, C. J. (2005). Applying the technology acceptance model and flow theory to online e-Learning users. *Issues in Information Systems, 6*(2), 175-181.

Liu, S. H., Liao, H. L., & Pratt, J. A. (2009). Impact of media richness and flow on e-Learning technology acceptance. *Computers & Education*, *52*(3), 599–607.

Liu, W., Cheok, A. D., Mei-Ling, C. L., & Theng, Y. L. (2007). Mixed reality classroom: learning from entertainment. *Proceedings of the 2nd international conference on Digital interactive media in entertainment and arts*, 65-72.

Lorenzo, G., & Moore, J. C. (2000). *Five pillars of quality online education*. Needham: Alfred P. Sloan Foundation.

Luarn, P., & Lin, H. H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior, 21*(6), 873-891.

Lunenburg, F. C. (2008). *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences*. Thousand Oaks, CA: Corwin Press.

Mahdizadeh, H., Biemans, H., & Mulder, M. (2008). Determining factors of the use of e-Learning environments by university teachers. *Computers & Education, 51*(1), 142-154.

Mahmood, M. A., Hall, L., & Swanberg, D. L. (2001). Factors affecting information technology usage: A meta-analysis of the empirical literature. *Journal of Organizational Computing and Electronic Commerce, 11*(2), 107-113.

Malhotra, N. K. (2010). *Marketing research: an applied orientation* (6th ed.). London: Pearson Education.

Marcoulides, G. A., & Saunders, C. (2006). PLS: a silver bullet. *MIS Quarterly, 30*(2), 1–7.

Marks, R. B., Sibley, S. D., & Arbaugh, J. B. (2005). A structural equation model of predictors for effective online learning. *Journal of Management Education, 29*(4), 531-563.

Marshall, S., & Mitchell, G. (2003). Potential indicators of e-Learning process capability. *Educause in Australasia*, 99-106.

Marshall, S., & Mitchell, G. (2004). Applying SPICE to e-Learning: An e-Learning maturity model. *Conferences in Research and Practice in Information Technology, 30*, 185-191.

Marshall, S., & Mitchell, G. (2005). E-Learning process maturity in the New Zealand Tartiary Sector. Retrieved from http://www.caudit.edu.au/ educauseaustralasia/2005/PDF/C3.pdf

Martins, L. L., & Kellermanns, F. W. (2004). A model of business school students' acceptance of a web-based course management system. *Academy of Management Learning and Education, 3*(1), 7-26.

Masrom, M., Zainon, O., & Rahiman, R. (2008). Critical success in e-Learning: An examination of technological and institutional support factors. *International Journal of Cyber Society and Education, 1* (2), 131-142.

Massey University Information Technologies Services web site *http://www.massey.ac.nz/massey/staffroom/teaching-and-learning/stream-4-staff/about-stream/what-electronic-tools-are-available/what-electronic-tools-are-available_home.cfm*. Retrieved November, 2012, from Massey University web site.

McGill, T. J., & Klobas, J. E. (2009). A task–technology fit view of learning management system impact. *Computers & Education, 52*(2), 496-508.

McGill, T., & Klobas, J. (2008). User developed application success: Sources and effects of involvement. Behaviour and Information Technology, 27(5), 407-422.

McGill, T., Hobbs, V., & Kloba, J. (2003). User-developed applications and information systems success: a test of DeLone and McLean's model. *Information Resources Management Journal, 16*(1), 24–45.

McGill, T., Klobas, J., & Renzi, S. (2008). The relationship between LMS Use and teacher performance: The role of task-technology fit. *19th Australasian Conference on Information Systems (ACIS 2008)*, Christchurch, New Zealand. Available online at http://aisel.aisnet.org/acis2008/82.

McGorry, S. Y. (2003). Measuring quality in online programs. *The Internet and Higher Education, 6*(2), 159-177.

Menchaca, M. P., & Bekele, T. A. (2008). Learner and instructor identified success factors in distance education. *Distance Education, 29*(3), 231-252.

Miltiadou, M. & Savenye, W.C. (2003). Applying Social Cognitive Constructs of Motivation to Enhance Student Success in Online Distance Education. *AACE Journal, 11*(1), 78-95.

Moodle Community. http://moodle.org. Retrieved November 2012, from Moodle Community web site.

MUHECa. (2010). *http://www.massey.ac.nz/massey/research/research-ethics/human-ethics/code/en/code.cfm.* Retrieved March 2010, from Code of Ethical Conduct.

MUHECb. (2010). *http://www.massey.ac.nz/massey/research/research-ethics/human-ethics/approval.cfm.* Retrieved March, 2010, from Massey University Human Ethics Committee.

MUHECc. (2010). *http://www.massey.ac.nz/massey/fms/Human%20Ethics/Documents/Screening%20Questionnaire%202009%20-%20July%20revision.pdf.* Retrieved March 2010, from Screening Questionnaire.

Muylle, S., Moenaert, R., & Despontin, M. (2004). The conceptualization and empirical validation of web site user satisfaction. *Information and Management, 41*(5), 543-560.

Naveh, G., Tubin, D., & Pliskin, A. (2010). Student LMS use and satisfaction in academic institutions: The organizational perspective. *The Internet and Higher Education, 13*(3), 127-133.

Ngai, E. W. T., Poon, J. K. L., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education, 48*(2), 250- 267.

Nord, J. H., & Nord, G. D. (1995). MIS research: Journal status assessment and analysis. *Information & Management, 29*(1), 29-42.

Norman, D., & Spohrer, J. C. (1996). Learner centered education. *Communications of the ACM, 39*(4), 24-27.

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: McGraw-Hill.

Nunnally, J. C., &Bernstein, I. H. (1994). *Psychometric Theory.* (3d ed.), New York: McGraw-Hill.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*(4), 460-469.

Ong, C. S., & Lai, J. Y. (2006). Gender differences in perceptions and relationships among dominants of e-Learning acceptance. *Computers in Human Behaviour, 22*(5), 816-829.

Ong, C., Lai, J., & Wang, Y. (2004). Factors affecting engineers' acceptance of asynchronous e-Learning systems in high-tech companies. *Information & Management, 41*(6), 795-804.

Orlikowski, W. J., & Baroudi, J. J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research, 2*(1), 1-28.

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-Learning systems in the higher education context: An empirical investigation. *Computers & Education, 53*(4), 1285-1296.

Ozkan, S., Koseler, R., & Baykal, N. (2009). Evaluating learning management systems: Adoption of hexagonal e-Learning assessment model in higher education. *Transforming Government: People, Process and Policy, 3*(2), 111-130.

Padilla-Meléndez, A., Garrido-Moreno, A., & Aguila-Obra, A. R. D. (2008). Factors affecting e-collaboration technology use among management students. *Computers & Education*, *51*(2), 609-623.

Paechter, M., Maiera, B., & Macher, D. (2010). Students' expectations of and experiences in e-Learning: Their relation to learning achievements and course satisfaction. *Computers & Education*, *54*(1), 222-229.

Pajares, F., & Miller, M. D. (1994). Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis. *Journal of Educational Psychology, 86*(2), 193-203.

Pallant, J. (2011). *SPSS survival manual: A step by step guide to data analysis using SPSS* (4th ed.). New South Wales: Allen & Unwin.

Palmer, S. R., & Holt, D. M. (2009). Examining student satisfaction with wholly online learning. *Journal of Computer Assisted Learning*, *25*(2), 101–113.

Paraskevaa, F., Boutaa, H., & Papagiannib, A. (2008). Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in educational practice. *Computers & Education*, *50*(3), 1084-1091.

Parasuraman, A., Zeithamal, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *The Journal of Marketing, 49*(4), 41-50.

Parasuraman, A., Zeithamal, V. A., & Berry, L. L. (1994). Alternative scales for measuring service quality: A comparative assessment based on psychometric and diagnostic criteria. *Journal of Retailing, 70*(3), 201-230.

Park, S. Y. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-Learning. *Educational Technology & Society, 12*(3), 150–162.

Park, Y. A., & Gretzel, U. (2007). Success factors for destination marketing web sites: A qualitative meta-analysis. Journal of Travel Research, *46*(1), 46–63.

Patterson, P. (1995). Modelling the relationship between perceived value, satisfaction and repurchase intentions in a business-to-business, services context: an empirical examination. *International Journal of Service Industry Management, 8*(5), 414-434.

Petruzzellis, L., D'Uggento, A. M., & Romanazzi, S. (2006). Student satisfaction and quality of service in Italian universities. *Managing Service Quality, 16* (4), 339-364.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, *17*(3), 236–263.

Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. Information and Management, 46(3), 159-166.

Phang, C. W.,   Sutanto, J.,   Kankanhalli, A.,   Yan, L.,   Tan, B.C.Y., & Teo, H. H. (2006). Senior citizens' acceptance of information systems: A study in the context of e-Government services. *IEEE Transactions on Engineering Management*, *53*(4), 555-569.

Phipps, R., & Merisotis, J. (2000). *Quality on the line: Benchmarks for success in internet-based distance education*. Washington, DC: The Institute for Higher Education Policy, Retrived from http://www.nea.org/he/abouthe/Quality.pdf.

Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-based virtual learning environments: A research framework and a preliminary assessment of effectiveness in basic IT skills training. *MIS Quarterly, 25*(4), 401-426.

Pitt, L.F., Watson, R.T., & Kavan, C. B. (1995). Service quality: A measure of information systems effectiveness. *MIS Quarterly, 19*(2), 173-187.

Pituch, K. A., & Lee, Y. K. (2006). The influence of system characteristics on e-Learning use. *Computers & Education, 47*(2), 222–244.

Raaij, E. M., & Schepers, J. J. L. (2008). The acceptance and use of a virtual learning environment in China. *Computers & Education, 50*(3), 838-852.

Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research, 13*(1), 50–69.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 130*(2), 261–288.

Roca, J. C., Chiu, C. M., & Martinez, F. J. (2006). Understanding e-Learning continuance intention: An extension of the technology acceptance model. *International Journal Of Human-Computer Studies, 64*(8), 683-696.

Roca, J., & Gagne, M. (2008). Understanding e-Learning continuance intention in the workplace: A self-determination theory perspective. *Computers in Human Behavior, 24*(4), 1585.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rosenberg, M. J. (2001). *e-Learning: strategies for delivering knowledge in the digital age*. New York: McGraw-Hill.

Roth, P. L. (1994). Missing data: A conceptual review for applied psychologists. *Personnel Psychology, 47*(3), 537–560.

Rovai, A. P., Wighting, M. J., Baker, J. D., & Grooms, L. D. (2009). Development of an instrument to measure perceived cognitive, affective, and psychomotor learning in traditional and virtual classroom higher education settings. *The Internet and Higher Education*, *12*(1), 7-13.

Saade, R. G. (2007). Dimensions of Perceived Usefulness: Toward Enhanced Assessment. *Decision Sciences Journal of Innovative Education, 5*(2), 289-31.

Saadé, R. G., & Bahli, B. (2005). The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: an extension of the technology acceptance model. *Information & Management*, *42*(2), 317-327.

Saarinen, T. (1996). An expanded instrument for evaluating information system success. *Information & Management, 31*(2), 103-118.

Saleh, H. K. (2008). Computer self-efficacy of university faculty in Lebanon. *Educational Technology Research and Development, 56*(2), 229-240.

Samarawickrema, G., & Stacey, E. (2007). Adopting web-based learning and teaching: A case study in higher education. *Distance Education, 28*(3), 313-333.

Sánchez-Francisco, M. J., Martínez-López, J., & Martín-Velicia, F. A. (2009). Exploring the impact of individualism and uncertainty avoidance in web-based electronic learning: An empirical analysis in European higher education. *Computers & Education, 52*(3), 588-598.

Santhanam, R., Sasidharan, S., & Webster, J. (2008). Using self-regulatory learning to enhance e-Learning-based information technology training. *Information Systems Research, 19*(1), 26-47.

Seddon, F., & Biasutti, M. (2009). Evaluating a music e-learning resource: The participants perspective. *Computers & Education, 53*(3), 541-549.

Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research, 8*(3), 240-253.

Seddon, P. B., & Kiew, M. Y. (1994). A partial test and development of the DeLone and McLean model of IS success, *Proceedings of the international conference of Information Systems*, 99-110.

Sekaran, U. (2006). *Research Methods for Business: A skill building approach* (4th ed.). New Delhi: John Wiley & Sons.

Selim, H. M. (2007). Critical success factors for e-Learning acceptance: Confirmatory factor models. *Computers & Education, 49*(2), 396-413.

Shee, D. Y. & Wang, Y. S. (2008). Multi-criteria evaluation of the web-based e-learning system: A methodology based on learner satisfaction and its applications. *Computers & Education*, *50*(3), 894‑905.

Sheng, S., Jue, Z., & Weiwei, T. (2008). Extending TAM for online learning systems: An intrinsic motivation perspective. *Tsinghua Science and Technology, 13*(3), 312-317.

Sher, A. (2009). Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in web-based online learning. *Journal of Interactive Online Learning, 8(*2), 102-120.

Smarkola, C. (2008). Efficacy of a planned behavior model: Beliefs that contribute to computer usage intentions of student teachers and experienced teachers. *Computers in Human Behavior, 24*(3), 1196-1215.

Soon, K. H., Sook, K. I., Jung, C. W., & Im, K. M. (2000). The effects of Internet-based distance learning in nursing. *Computers in Nursing, 18*(1), 19-25.

Soong, M. H. B., Chan, H. C., Chua, B. C., & Loh, K. F. (2001). Critical success factors for on-line course resources. *Computers & Education*, *36*(2), 101-120.

Sorebo, O., Halvari, H., Gulli, V. F., & Kristiansen, R. (2009). The role of self-determination theory in explaining teachers' motivation to continue to use e-Learning technology. *Computers & Education, 53*(4), 1177-1187.

Sosik, J. J., Kahai, S. S., & Piovoso, M. J. (2009). Silver bullet or voodoo statistics: A primer for using the partial least squares data analytic technique in group and organization research. *Group & Organization Management, 34*(1), 5-36.

Stajkovic, A. D. and Luthans, F. (1998). Social Cognitive Theory and Self Efficacy: Going Beyond Traditional Motivational and Behavioral Approaches, *Organizational dynamics, Spring*, 62-74.

Stein, S. J., Shephard, K., & Harris, I. (2011). Conceptions of e-Learning and professional development for e-Learning held by tertiary educators in New Zealand. *British Journal of Educational Technology, 42*(1), 145-165.

Stewart, S., & Davis, D. (2012). On the MUVE or in decline: Reflecting on the sustainability of the Virtual Birth Centre developed in Second Life. Australasian Journal of Educational Technology, 28(3), 480-503.

Straub, D. W., & Gefen, D. (1997). Gender differences in the perception and use of e-mail: an extension to the technology acceptance model. *MIS Quarterly, 21*(4), 389-400.

Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded theory procedures and techniques*. London: Sage Publications.

Strauss, A., & Corbin, J. (2008). *Basics of qualitative research: techniques and procedures for developing grounded theory* (3rd ed.), London: SAGE publications.

Sun, P., Tasi, R. J., Finger, G., & Chen, Y. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education, 50*(4), 1183-1202.

Swan, K., Shea, P., Fredericksen, E., Pickett, A., Pelz, W., & Maher, G. (2000). Building knowledge building communities: consistencies, contact and communication in the virtual classroom. *Journal of Educational Computing Research, 23*(4), 359-383.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York: Harper Collins.

Tao, Y. H., Cheng, C. J., & Sun, Z. Y. (2009). What influences college students to continue using business simulation games? The Taiwan experience. *Computers & Education, 53*(3), 929-939.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage - A test of competing models. *Information Systems Research, 6*(2), 144-176.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modelling. *Computational Statistics & Data Analysis, 48*(1), 159-205.

Teo, T., Lee, C. B., Chai, C. S., & Wong, S. L. (2009). Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multi-group invariance analysis of the technology acceptance model (TAM). *Computers & Education, 53*(3), 1000-1009.

Terzis, V., & Economides, A. A. (2011). Computer based assessment: Gender differences in perceptions and acceptance. *Computers in Human Behavior, 27*(6), 2108-2122.

Thomas, A., & Stratton, G. (2006). What we are really doing with ICT in physical education: a national audit of equipment, use, teacher attitudes, support, and training. *British Journal of Educational Technology, 37*(4), 617–632.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15*(1), 125-143.

Thong, J., & Yap, C. (1996). Information systems effectiveness: a user satisfaction approach. *Information Processing & Management, 32*(5), 601-610.

Thong, Y. L. J. (1996). *Information systems adoption and implementation in small businesses in Singapore*. (Unpublished doctoral dissertation), Victoria University, Melbourne.

Tian, F., Zhang, H., & Lu, Y. (2003). Learning Bayesian Networks from Incomplete Data Based on EMI Method. *Proceedings of the Third IEEE International Conference on Data Mining*, 323-330.

Torkzadeha, D., & Doll, W. H. (1999). The development of a tool for measuring the perceived impact of information technology on work. *Omega International Journal of Management Science, 27*(3), 327-339.

Vatanasombut, B., Igbaria, M., Stylianou, A. C., & Rodgers, W. (2008). Information systems continuance intention of web-based applications customers: The case of online banking. *Information & Management, 45*(7), 419-428.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.).

Walker, S. L., & Fraser, B. J. (2005). Development and validation of an instrument for assessing distance education learning environments in higher education: The distance education learning environments survey (DELES). *Learning Environments Research, 8*(3), 289-308.

Wan, Z., Wang, Y., & Haggerty, N. (2008). Why people benefit from e-Learning differently: The effects of psychological processes on e-Learning outcomes. *Information & Management, 45*(8), 513–521.

Wang, H. C., & Chiu, Y. F. (2011). Assessing e-Learning 2.0 systems success. *Computers & Education, 57*(2), 1790-180.

Wang, J., Solan, D., & Ghods, A. (2010). Distance learning success – a perspective from socio-technical systems theory. *Behaviour & Information Technology, 29*(3), 321-329.

Wang, W. T., & Wang, C. C. (2009). An empirical study of instructor adoption of web-based learning systems. *Computers & Education, 53*(3), 761-774.

Wang, Y. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management, 41*(1), 75-86.

Wang, Y. S. (2008). Assessing e-commerce systems success: a respecification and validation of the DeLone and McLean model of IS success. *Information Systems Journal, 18*(5), 529–557.

Wang, Y. S., & Liao, Y. W. (2008). Assessing e-Government systems success: A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly, 25*(4), 717-733.

Wang, Y., Wang, H., & Shee, D. Y. (2007). Measuring e-Learning system success in an organizational context: Scale development and validation. *Computers in Human Behaviour, 23*(4), 1792-1808.

Wangpipatwong, S., Chutimaskul, W., & Papasratorn, B. (2008). Understanding citizen's continuance intention to use e-Government website: a composite view of technology acceptance model and computer self-efficacy. *The Electronic Journal of e-Government, 6*(1), 55 – 64.

Wasilik, O., & Bolliger, D. U. (2009). Faculty satisfaction in the online environment: An institutional study. *The Internet and Higher Education, 12*(3-4), 173-178.

Wayne, I. (1975). Non response, sample size, and the allocation of resources. *Public Opinion Quarterly, 39*(4), 557-562.

Webster, J., & Hackley, P. (1997). Teaching effectiveness in technology-mediated distance learning. *Academy of Management Journal, 40*(6). 1282-1309.

Webster, J., & Watson, R. T. (2002). Analysing the past to prepare for the future: Writing a literature review. *MIS Quarterly, 26*(2), 13-23.

Wixom, H., & Watson, H. J. (2001). An empirical investigation of the factors affecting data warehousing success. *MIS Quarterly, 25*(1), 17-41.

Wood, R. E., & Bandura, A. (1989). Social cognitive theory of organizational management, *Academy of Management Review, 14*(3), 361–384.

Wu, J. H., & Wang, Y. M. (2006). Measuring KMS success: A respecification of the DeLone and McLean's model. *Information & Management*, *43*(6), 728-739.

Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-Learning system environment. *Computers & Education, 55*(1), 155-164.

Wu, J., Tsai, R. J., Chen, C. C., & Wu, Y. (2006). An integrative model to predict the continuance use of electronic learning systems: Hints for teaching. *International Journal on e-Learning*, *5*(2), 287-302.

Yengin, I., Karahoca, A., & Karahoca, D. (2011). e-Learning success model for instructors' satisfaction in perspective of interaction and usability outcomes. *Procedia Computer Science, 3*, 1393-1403.

Yeung, P., & Jordan, E. (2007). The continued usage of business e-Learning courses in Hong Kong corporations. *Education & Information Technologies, 12*(3), 175-188.

Yi, M. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies, 59*(4), 431–449.

Yukselturk, E., & Bulut, S. (2007). Predictors for student success in an online course. *Educational Technology & Society, 10*(2), 71-83.

Zajacova, A., Lynch, S. M., & Espenshade, T. J. (2005). Self-efficacy, stress, and academic success in college. *Research in Higher Education, 46*(6), 677-706.

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker, J. F. (2006). Instructional video in e-Learning: assessing the impact of interactive video on learning effectiveness. *Information & Management, 43*(1), 15-27.

Zhao, Y. (2007). Social studies teachers' perspectives of technology integration. *Journal of Technology and Teacher Education, 15*(3), 311–333.

Zhu, F. X., Wymer, W., & Chen, I. (2002). IT-based services and service quality in consumer banking. *International Journal of Service Industry Management, 13*(1), 69- 90.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*(1), 3-17.

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29*(3), 663-676.

Zviran, M., Glezer, C., & Avni, I. (2006). User satisfaction from commercial web sites: The effect of design and use. *Information & Management, 43*(2), 157-178.

APPENDICES

Appendix A: Cause and effect relationships for the study from the instructor perspective and for the study from the learner perspective

Hypothesis		Cause [a]		Effect [a]
		Model from the instructor perspective		
T1	O	Quality of institutional support to instructors	I	Instructor satisfaction
T2	O	Quality of institutional support to instructors	I	Instructor use of e-Learning system
T3	O	Quality of the e-learning system	I	Instructor satisfaction
T4	O	Quality of the e-learning system	I	Instructor use of e-Learning system
T5	I	Instructor satisfaction	I	Instructor use of e-Learning system
T6	I	Instructor self-efficacy	I	Instructor satisfaction
T7	I	Instructor self-efficacy	I	Instructor use of e-Learning system
T8	O	Quality of e-Learning development and implementation process	I	Instructor satisfaction
T9	O	Quality of e-Learning development and implementation process	I	Instructor use of e-Learning system
T10	I	Instructor satisfaction	I	Quality of e-learning content
T11	I	Instructor satisfaction	I	Instructor support to learners
T12	I	Instructor use of e-Learning system	I	Quality of e-learning content
T13	I	Instructor use of e-Learning system	I	Instructor support to learners
		Model from the learner perspective		
S1	O	Quality of institutional support to learners	L	Learner satisfaction
S2	O	Quality of institutional support to learners	L	Learner use of e-Learning system
S3	O	Quality of e-learning system	L	Learner satisfaction
S4	O	Quality of e-learning system	L	Learner use of e-Learning system
S5	L	Learner satisfaction	L	Learner use of e-Learning system
S6	L	Learner self-efficacy	L	Learner satisfaction
S7	L	Learner self-efficacy	L	Learner use of e-Learning system
S8	I	Quality of e-learning content	L	Learner satisfaction
S9	I	Quality of e-learning content	L	Learner use of e-Learning system
S10	I	Quality of instructor support to learners	L	Learner satisfaction
S11	I	Quality of instructor support to learners	L	Learner use of e-Learning system
S12	L	Learner satisfaction	L	Level of Learning
S13	L	Learner satisfaction	L	e-Learning continuance intention
S14	L	Learner use of e-Learning system	L	Level of learning
S15	L	Learner use of e-Learning system	L	e-Learning continuance intention
S16	L	Learner self-efficacy	L	e-Learning continuance intention
S17	L	Task value	L	Learner satisfaction
S18	L	Task value	L	Level of learning
S19	L	Task value	L	e-Learning continuance intention

[a] Organisational, instructor, and learner dimensions are labelled as O, I, and L, respectively.

Appendix B: Questionnaire used for the study from the instructor perspective

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Development and validation of a comprehensive model of e-Learning systems success

This study is devoted to developing and validating a comprehensive model of e-Learning success. Items were generated based on an extensive literature review covering more than 100 journal articles from information systems, psychology and educational technology journals. An outline of the literature review and a summary of validation outcomes will be provided to participants on request.

This questionnaire has 9 sections. It will take you about 10 minutes to complete. Please return the completed questionnaire in the self-addressed, postage-paid envelope provided.

Do you use e-Learning for the delivery of your courses?

☐ Yes **(Please continue to Section A)**

☐ No (This survey is intended for the lecturers involved in online teaching. Thank you very much for your interest in participating in this survey. Please return the questionnaire in the self-addressed, prepaid envelope).

A. e-Learning development and implementation process

The following statements characterise how your institution manages the e-Learning development and implementation process at your institution. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
DQ1	The e-Learning programme's educational effectiveness is measured using several methods.	☐	☐	☐	☐	☐	☐	☐
DQ2	An evaluation process is used to improve the teaching/learning outcomes.	☐	☐	☐	☐	☐	☐	☐
DQ3	Successful and innovative uses of technology for teaching are taken into account when measuring effectiveness of the e-Learning programme.	☐	☐	☐	☐	☐	☐	☐
DQ4	Instructors are involved during the initial stages of the development of the e-Learning programme.	☐	☐	☐	☐	☐	☐	☐
DQ5	Instructor satisfaction with the e-Learning programme is evaluated by regular surveys.	☐	☐	☐	☐	☐	☐	☐

QUAL1 Please comment on your answers above or suggest any other features of your institution's e-Learning development and implementation process that may be relevant to e-Learning success in your courses.

B. e-Learning system

The following statements describe the capabilities of the e-Learning system at your institution. Please tick the answer which best reflects your opinion about system capabilities in relation to using the e-Learning system in your courses.

		1 Strongly disagree						7 Strongly agree
SQ1	e-Learning system allows me control over my teaching activities.	☐	☐	☐	☐	☐	☐	☐
SQ2	e-Learning system offers flexibility as to time and place of use.	☐	☐	☐	☐	☐	☐	☐
SQ3	e-Learning system provides functions I need to successfully conduct my teaching activities.	☐	☐	☐	☐	☐	☐	☐
SQ4	e-Learning system has well-designed user interfaces.	☐	☐	☐	☐	☐	☐	☐
SQ5	e-Learning system provides high-speed information access.	☐	☐	☐	☐	☐	☐	☐
SQ6	e-Learning system is robust and reliable.	☐	☐	☐	☐	☐	☐	☐
SQ7	Steps to complete a task (e.g. uploading and maintaining files) in the e-Learning system follow a logical sequence.	☐	☐	☐	☐	☐	☐	☐
SQ8	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.	☐	☐	☐	☐	☐	☐	☐

QUAL2 Please comment on your answers above or suggest any other attributes of your institution's e-Learning system that may be important for e-Learning success in your courses.

C. Overall support

The following statements describe the e-Learning support services provided to you as a teacher. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
ISI1	Technical assistance in course development is available to us.	☐	☐	☐	☐	☐	☐	☐

ISI2	We are encouraged to use technical assistance in course development.	☐	☐	☐	☐	☐	☐	☐
ISI3	We are assisted in the transition from traditional classroom teaching to teaching with the use of e-Learning.	☐	☐	☐	☐	☐	☐	☐
ISI4	To facilitate the sharing of e-Learning expertise and experiences, we are encouraged to engage in peer-to-peer mentoring.	☐	☐	☐	☐	☐	☐	☐
ISI5	e-Learning instructor training continues throughout the progression of the online class.	☐	☐	☐	☐	☐	☐	☐
ISI6	We are provided with written resources to deal with issues arising from student use of electronically accessed data.	☐	☐	☐	☐	☐	☐	☐

QUAL3 Please comment on your answers above or suggest any other aspects of overall support provided by your institution to you as a teacher that may be relevant to e-Learning success in your courses.

D. e-Learning course content

The following statements characterise the e-Learning content in your courses in terms of its accuracy, relevance, comprehensibility, timeliness. Please tick the answer which best reflects your opinion.

		1 **Strongly disagree**						**7** **Strongly agree**
CQ1	Courses are designed with a consistent structure that is easily understandable to students of varying learning styles.	☐	☐	☐	☐	☐	☐	☐
CQ2	e-Learning instructional materials are reviewed periodically to ensure they meet programme standards.	☐	☐	☐	☐	☐	☐	☐
CQ3	Students are provided with course information via the e-Learning system that outlines the course objectives, concepts, and main ideas.	☐	☐	☐	☐	☐	☐	☐
CQ4	Learning outcomes provided via the e-Learning system are summarized in clearly written, straightforward statements.	☐	☐	☐	☐	☐	☐	☐
CQ5	e-Learning activities for	☐	☐	☐	☐	☐	☐	☐

		1	2	3	4	5	6	7
	students are designed to encourage students to work in groups utilizing problem-solving activities to develop topic understanding.							
CQ6	Students have access to up to date information via the e-Learning system.	☐	☐	☐	☐	☐	☐	☐

QUAL4 Please comment on your answers above or suggest any other aspects of e-Learning course content in your courses that may be relevant to e-Learning success.

E. Instructor support to students

The following statements characterise the support you provide to your students involved in e-Learning. Please tick the answer which best reflects your opinion.

		1 **Strongly disagree**						**7** **Strongly agree**
ISS1	Student interaction with instructors via the e-Learning system is facilitated through a variety of ways.	☐	☐	☐	☐	☐	☐	☐
ISS2	Student interactions with other students via the e-Learning system are facilitated through a variety of ways.	☐	☐	☐	☐	☐	☐	☐
ISS3	Instructors clearly explain how communication via the e-Learning system should be used.	☐	☐	☐	☐	☐	☐	☐
ISS4	Students are encouraged to work with each other and instructors.	☐	☐	☐	☐	☐	☐	☐
ISS5	Answers to questions posted via the e-Learning system are constructive.	☐	☐	☐	☐	☐	☐	☐
ISS6	Answers to questions are provided in a timely manner.	☐	☐	☐	☐	☐	☐	☐
ISS7	Instructors manage student expectations over the type and timeliness of responses to student communications.	☐	☐	☐	☐	☐	☐	☐
ISS8	I have the ability to solve students' problems relating to using e-Learning in my courses.	☐	☐	☐	☐	☐	☐	☐

QUAL5 Please comment on your answers above or suggest any other aspects of instructor support in your courses that may be relevant to e-Learning success.

F. Instructor satisfaction

The following statements characterise the degree of your satisfaction with using the e-Learning system in your courses. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						**7** Strongly agree
ISAT1	I am satisfied with the performance of the e-Learning system.	☐	☐	☐	☐	☐	☐	☐
ISAT2	I am pleased with the experience of using the e-Learning system.	☐	☐	☐	☐	☐	☐	☐
ISAT3	The decision to use the e-Learning system was a wise one.	☐	☐	☐	☐	☐	☐	☐

QUAL6 Please comment on your answers above.

G. Instructor self-efficacy

The following statements characterise your confidence in successfully delivering courses online. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						**7** Strongly agree
ISEF1	I am confident that I can use the e-Learning system for online teaching even if I have no previous experience with using some of the features that I need to use.	☐	☐	☐	☐	☐	☐	☐
ISEF2	I am confident that I can use the e-Learning system even if there is no one around to show me how to use it.	☐	☐	☐	☐	☐	☐	☐
ISEF3	I am confident that I can use the e-Learning system even if I have only the user manual for reference.	☐	☐	☐	☐	☐	☐	☐
ISEF4	I am confident that I can integrate the functions of the e-Learning system with my teaching plan.	☐	☐	☐	☐	☐	☐	☐

ISEF5	I am confident that I have adequate ability to operate the e-Learning system.	☐	☐	☐	☐	☐	☐	☐
QUAL7	Please comment on your answers above							

H. e-Learning system use by the instructor

The following statements characterise the extent to which you use the e-Learning system in your courses. Please tick the answer which best reflects your opinion.

		1 **Strongly disagree**						**7** **Strongly agree**
SUI1	I use e-Learning system to communicate with my students.	☐	☐	☐	☐	☐	☐	☐
SUI2	I use e-Learning system to distribute course assignments to my students.	☐	☐	☐	☐	☐	☐	☐
SUI3	I encourage my students to submit their assignments using e-Learning system.	☐	☐	☐	☐	☐	☐	☐
SUI4	I use e-Learning system to distribute course materials to my students.	☐	☐	☐	☐	☐	☐	☐
SUI5	I use e-Learning system to execute student assessments (e.g. online tests, quizzes).	☐	☐	☐	☐	☐	☐	☐
SUI6	I use e-Learning system to issue the grades of my students.	☐	☐	☐	☐	☐	☐	☐
SUI7	I encourage my students to discuss the course with one another through the e-Learning system.	☐	☐	☐	☐	☐	☐	☐
SUI8	I use e-Learning system to encourage peer-to-peer collaboration between students in their studies.	☐	☐	☐	☐	☐	☐	☐

QUAL8 Please comment on your answers above or suggest any other aspects of e-Learning system use by instructors in your courses that may be important for e-Learning success.

QUAL9 Please suggest any other factors (not covered by questions in this survey) that you think are important in determining and demonstrating e-Learning s uccess in your courses.

I. Demographic questions

I1	Years of teaching experience	☐ Less than 1 year	☐ 16-20 years

		☐ 1-5 years ☐ 6-10 years ☐ 11-15 years	☐ 21-25 years ☐ More than 25 years
I2	Years of experience with online teaching	☐ None ☐ Less than1 year ☐ 1-5 years	☐ 6-10 years ☐ 11-15 years ☐ More than 15 years
I3	Position	☐ Professor ☐ Associate professor ☐ Senior Lecturer Other (Please specify):	☐ Lecturer ☐ Senior tutor ☐ Tutor
I4	Age	☐ 25-30 years ☐ 31-35 years ☐ 36-40 years	☐ 41-45 years ☐ 46-50 years ☐ Above 50 years
I5	Gender	☐ Male ☐ Female	

Thank you very much for your time. Please return the questionnaire in the self-addressed, prepaid envelope.

Appendix C: Information sheet used for the study from the instructor perspective

Development and validation of a comprehensive model of e-Learning systems success

QUESTIONNAIRE INFORMATION SHEET

Dear Respondent,
You are invited to participate in this study regarding the validation of a comprehensive model of e-Learning systems success that I am conducting as part of my doctoral study. You are under no obligation to accept this invitation. However, your contribution will be valuable and much appreciated. Please read below for details of my study.

Researcher Introduction
I am Samantha Samarasinghe, and I am currently pursuing my doctoral degree at Massey University, Palmerston North. My supervisors are Dr. Alexei Tretiakov and Dr. Barbara Crump and my area of interest is in studying the success of e-Learning systems in the higher education context. I am conducting this study as a partial fulfilment of the requirements for the PhD in Information Systems from Massey University.

Project Description and Invitation
The purpose of this study is to develop and validate a comprehensive model of e-Learning systems success. I formulated the model based on an extensive literature review covering more than 100 journal articles from information systems, educational technology and psychology. The findings of this study will benefit the researchers and the practitioners in e-Learning by exploring the notion of e-Learning systems success from a variety of perspectives.

Participant Identification and Recruitment
I obtained your contact details from the publicly available official web site of your university.

Data Management
All information provided by you will be kept strictly confidential. The information gathered will be stored securely, according to Massey University regulations and results will be used only for the purposes of this study. Your responses will be aggregated with the responses of all other respondents and no individual can be identified.

Participant's Rights

You have the right to:

- decline to participate,
- refuse to answer any particular question,
- ask any questions about the study at any time during participation,
- be given access to a summary of the findings of the study when it is concluded,
- withdraw from the research project at any stage.

Committee Approval Statement

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by the University's Human Ethics Committees. The researcher(s) named below are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 3505249, email humanethics@massey.ac.nz.

Project Procedures

I would greatly appreciate if you could contribute to this study by completing the attached questionnaire. The estimated completion time for this questionnaire is about 10 minutes. Your completion and return of the questionnaire implies consent.

Project Contacts

Please do not hesitate to contact myself or my supervisors if you have any questions about this study at the addresses below:

Doctoral Research Student
Samantha Samarasinghe
School of Management
Massey University
Private Bag 11 222
Palmerston North, New Zealand.
E-mail: S.M.Samarasinghe@massey.ac.nz

Alternatively, you may contact one of my supervisors:

Main Doctoral Supervisor
Dr. Alexei Tretiakov
School of Management
Massey University
Private Bag 11 222
Palmerston North, New Zealand.
E-mail : A.Tretiakov@massey.ac.nz

Co Doctoral Supervisor
Dr. Barbara Crump
School of Management
Massey University
Private Box 756
Wellington, New Zealand.
E-mail : B.J.Crump@massey.ac.nz

Appendix D: Cover letter used for the study from the instructor perspective

Dear xxxxx,

I am a doctoral student in the School of Management at Massey University, Palmerston North. As part of my PhD project I intend to explore the **determinants of e-Learning success**. My survey instrument is based on a comprehensive literature review exploring the notion of e-Learning systems success from information systems, educational technology and psychology perspectives (covering over 100 journal articles). The instrument was validated in a content validity study involving 43 experts.

I would like to invite you to participate in the survey, which will take approximately nine minutes of your time. As a participant, you will receive a summary of survey results along with an outline of the literature on which the survey questions are based.

I am confident that you will find the survey questions very informative. Completing the survey will offer you an opportunity to reflect on e-Learning practices in your courses and in your organization from a number of perspectives.

Please, complete the survey on-line at http://is-research.massey.ac.nz/elsuccess. Use "xxx" as the token number to complete the survey.

Alternatively, if you prefer to work with a hard copy, please let me know and I'll post you the necessary forms by regular mail.

The data you enter will allow me to validate my research model, which is crucial for the success of my PhD project.

For further details about my research, refer to my information sheet.

Thank you for considering this. I look forward to hearing from you.

Yours Sincerely,

Samantha Samarasinghe
Doctoral research student
School of Management
Massey University
Palmerston North

Appendix E: First reminder used for the study from the instructor perspective

Dear xxxx,

Re: The study of the development and validation of a comprehensive model of e-Learning systems success

Recently I invited you to participate in a survey about e-Learning success. I realise that this is a very busy time of year for you and you may have overlooked responding to it.

However the survey is still available and may be accessed by clicking on the link below:
http://is-research.massey.ac.nz/elqualc

Please note that your token number to participate the survey is xxx.

Alternatively, if you prefer to work with a hard copy, please let me know by a return email. I'll gladly post you the necessary information by regular mail.

The data you enter will contribute to a better understanding of the concept of e-Learning systems success and of e-Learning success determinants in New Zealand context. Your input is crucial for the success of my PhD project.

I thank you in advance for your commitment and your time.

Yours sincerely,

Samantha Samarasinghe
Doctoral Research Student
School of Management
Massey University
Palmerston North
New Zealand

Appendix F: Second reminder used for the study from the instructor perspective

Date

Dear xxxx,

Re: The study of the development and validation of a comprehensive model of e-Learning systems success

Recently I invited you to participate in a survey about e-Learning success. At the time of sending this mail, I have not yet received your response.

If you prefer to work with a hard copy, I have enclosed my questionnaire, information sheet and a postage paid return envelope.

However the survey is still available online and may be accessed by clicking on the link below:

http://is-research.massey.ac.nz/elsuccess

Please note that your token number to participate the online survey is xxx.

The data you enter will contribute to a better understanding of the concept of e-Learning systems success and of e-Learning success determinants in New Zealand context.

I obtained your contact details from the publicly available official web site of your university. For further details about my research, refer to my information sheet.

I thank you in advance for your commitment and your time.

Yours sincerely,

Samantha Samarasinghe
Doctoral Research Student
School of Management
Massey University
Palmerston North

Appendix G: Questionnaire used for the study from the student perspective

MASSEY UNIVERSITY
COLLEGE OF BUSINESS
KAUPAPA WHAI PĀKIHI

A study to develop and validate a comprehensive model of e-Learning systems success

This questionnaire has 10 sections. It will take you about 05 minutes to complete. Please return the completed questionnaire in the self-addressed, postage-paid envelop provided.

A. Use of e-Learning system

The following statements characterise the extent to which you use the e-Learning system in this paper. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
SUS1	I use the e-Learning system frequently to study in this paper.	☐	☐	☐	☐	☐	☐	☐
SUS2	In most cases, I use the e-Learning system, because I choose to, not because I have to.	☐	☐	☐	☐	☐	☐	☐
SUS3	I use the e-Learning system a lot.	☐	☐	☐	☐	☐	☐	☐

B. Learner satisfaction

The following statements characterise the degree of your satisfaction with e-Learning in this paper. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
SSAT1	I am satisfied with the performance of the e-Learning system.	☐	☐	☐	☐	☐	☐	☐
SSAT2	I am pleased with the experience of using e-Learning.	☐	☐	☐	☐	☐	☐	☐
SSAT3	I think e-Learning is a good idea.	☐	☐	☐	☐	☐	☐	☐
SSAT4	I think the decision to use e-Learning is a wise one.	☐	☐	☐	☐	☐	☐	☐

C. e-Learning system

The following statements describe the capabilities (e.g. ease of use, accessibility, reliability) of the e-Learning system used in this paper. Please tick the answer which best reflects your opinion about the system capabilities in relation to your learning activities.

		1 Strongly disagree						7 Strongly agree
SQS1	e-Learning system offers flexibility as to time and place of use.	☐	☐	☐	☐	☐	☐	☐
SQS2	e-Learning system has well-designed user	☐	☐	☐	☐	☐	☐	☐

	interfaces.							
SQS3	The e-Learning system provides high-speed information access.	☐	☐	☐	☐	☐	☐	☐
SQS4	e-Learning system is robust and reliable.	☐	☐	☐	☐	☐	☐	☐
SQS5	Steps to complete a task in the e-Learning system follow a logical sequence.	☐	☐	☐	☐	☐	☐	☐
SQS6	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.	☐	☐	☐	☐	☐	☐	☐

D. e-Learning course content

The following statements characterise the quality of the e-Learning content in this paper in terms of its accuracy, relevance, comprehensibility, timeliness. Please tick the answer which best reflects your opinion.

		1 **Strongly disagree**						**7** **Strongly agree**
CQS1	Students are provided with information about the paper via the e-Learning system that outlines paper objectives, concepts, and main ideas.	☐	☐	☐	☐	☐	☐	☐
CQS2	Learning outcomes for the paper provided via the e-Learning system are summarized in clearly written, straightforward statements.	☐	☐	☐	☐	☐	☐	☐
CQS3	e-Learning in this paper is designed to encourage us to work together utilizing problem-solving activities to develop topic understanding.	☐	☐	☐	☐	☐	☐	☐
CQS4	The e-Learning content in this paper is communicated well.	☐	☐	☐	☐	☐	☐	☐
CQS5	The e-Learning system provides up-to-date content for this paper.	☐	☐	☐	☐	☐	☐	☐

E. Instructor support to students

The following statements characterise the instructor support provided to you in relation to e-Learning in this paper. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
ISSS1	Student interaction with instructor is facilitated through a variety of ways.	☐	☐	☐	☐	☐	☐	☐
ISSS2	Student interactions with other students are facilitated through a variety of ways.	☐	☐	☐	☐	☐	☐	☐
ISSS3	Instructors clearly explain how communication channels should be used during a course.	☐	☐	☐	☐	☐	☐	☐
ISSS4	Students are encouraged to work with each other and instructors.	☐	☐	☐	☐	☐	☐	☐
ISSS5	Instructors manage student expectations over the type and timeliness of responses to student communications.	☐	☐	☐	☐	☐	☐	☐
ISSS6	Feedback to assignments and questions is constructive.	☐	☐	☐	☐	☐	☐	☐
ISSS7	Feedback to assignments and answers to questions are provided in a timely manner.	☐	☐	☐	☐	☐	☐	☐
ISSS8	Instructors have the ability to solve the student problems relating to using e-Learning in the course.	☐	☐	☐	☐	☐	☐	☐

F. Institutional support for students

The following statements describe the e-Learning support services provided to you. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree

INS1	Detailed written information is supplied to the students about the e-Learning programme.	☐	☐	☐	☐	☐	☐	☐
INSL1	Students are provided with information to aid them in accessing materials provided in digital form.	☐	☐	☐	☐	☐	☐	☐
INSL2	Students are able to practice with any relevant technologies prior to commencing a course.	☐	☐	☐	☐	☐	☐	☐
INSL3	Easily accessible technical assistance is available to all students throughout the duration of a course/programme.	☐	☐	☐	☐	☐	☐	☐
INSL4	Students have access to sufficient library resources accessible through world wide web.	☐	☐	☐	☐	☐	☐	☐
INSL5	Students can register online for courses.	☐	☐	☐	☐	☐	☐	☐

G. Student self- efficacy

The following statements characterise your confidence in your ability to successfully learn the materials presentedin this paper online. Please tick the answer which best reflects your opinion.

		1						**7**
		Strongly disagree						**Strongly agree**
SSEF1	I could complete my learning activities using the e-Learning system if I had never used such a system.	☐	☐	☐	☐	☐	☐	☐
SSEF2	I could complete my learning activities using the e-Learning system even if I have only the online instructions for	☐	☐	☐	☐	☐	☐	☐

	reference.							
SSEF3	I could complete my learning activities using the e-Learning system if I had seen someone else using it before trying it myself.	☐	☐	☐	☐	☐	☐	☐
SSEF4	I could complete my learning activities using the e-Learning system if I had just the built-in-help facility for assistance.	☐	☐	☐	☐	☐	☐	☐

H. Level of learning

The following statements characterise the level of learning that can be achieved by using the e-Learning system in this paper. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
SL1	I can organize course material into a logical structure.	☐	☐	☐	☐	☐	☐	☐
SL2	I can intelligently critique the texts used in this course.	☐	☐	☐	☐	☐	☐	☐
SL3	I have changed my attitudes about the course subject matter as a result of this course.	☐	☐	☐	☐	☐	☐	☐
SL4	I feel more self-reliant as the result of what I learned in this course.	☐	☐	☐	☐	☐	☐	☐

I. Intention to continue e-Learning

The following statements characterise your intention to use e-Learning in the future based on your experience in this paper. Please tick the answer which best reflects your opinion.

		1 Strongly disagree						7 Strongly agree
CI1	If I could, I would like to continue using e-Learning in my learning activities in the future.	☐	☐	☐	☐	☐	☐	☐
CI2	I will continue using e-Learning as much as possible in my learning activities in	☐	☐	☐	☐	☐	☐	☐

	the future.							
CI3	I intend to increase the use of e-Learning in my learning activities in the future.	☐	☐	☐	☐	☐	☐	☐

J. Demographic questions

K1	Age	☐ Less than 20 years ☐ 20-25 years	☐ 26-30 years ☐ Above 30 years
K2	Gender	☐ Male	☐ Female
K3	Mode of study	☐ Internal	☐ Extramural
K4	Prior experience in e-Learning	☐ None ☐ 1-2 courses	☐ 3-4 courses ☐ More than 5 courses

Thank you very much for your time. Please return the questionnaire in the self-addressed, prepaid envelope.

Appendix H: Information sheet used for the study from the student perspective

Development and validation of a comprehensive model of e-Learning systems success

QUESTIONNAIRE INFORMATION SHEET

Dear Respondent,

You are invited to participate in this study regarding the validation of a comprehensive model of e-Learning systems success that I am conducting as part of my doctoral study. You are under no obligation to accept this invitation. However, your contribution will be valuable and much appreciated. Please read below for details of my study.

Researcher Introduction
I am Samantha Samarasinghe, and I am currently pursuing my doctoral degree at Massey University, Palmerston North. My supervisors are Dr. Alexei Tretiakov and Dr. Barbara Crump and my area of interest is in studying the success of e-Learning systems in the higher education context. I am conducting this study as a partial fulfillment of the requirements for the PhD in Information Systems from Massey University.

Project Description and Invitation
The purpose of this study is to develop and validate a comprehensive model of e-Learning systems success. I formulated the model based on an extensive literature review covering more than 100 journal articles from information systems, educational technology and psychology. The findings of this study will benefit the researchers and the practitioners in e-Learning by exploring the notion of e-Learning systems success from a variety of perspectives.

Data Management
All information provided by you will be kept strictly confidential. The information gathered will be stored securely, according to Massey University regulations and results will be used only for the purposes of this study. Your responses will be aggregated with the responses of all other respondents and no individual can be identified.

Participant's Rights
You have the right to:

- decline to participate,
- refuse to answer any particular question,
- ask any questions about the study at any time during participation,
- be given access to a summary of the findings of the study when it is concluded,
- withdraw from the research project at any stage.

Committee Approval Statement
This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by the University's Human Ethics Committees. The researcher(s) named below are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 3505249, email humanethics@massey.ac.nz.

Project Procedures
I would greatly appreciate if you could contribute to this study by completing the attached questionnaire. The estimated completion time for this questionnaire is about 10 minutes. Your completion and return of the questionnaire implies consent.

Project Contacts
Please do not hesitate to contact myself or my supervisors if you have any questions about this study at the addresses below:

Doctoral Research Student
Samantha Samarasinghe
School of Management
Massey University
Private Bag 11 222
Palmerston North, New Zealand.
E-mail: S.M.Samarasinghe@massey.ac.nz

Alternatively, you may contact one of my supervisors:

Main Doctoral Supervisor
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Massey University
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Wellington, New Zealand.
E-mail : B.J.Crump@massey.ac.nz

Appendix I: Cover letter used for the study from the student perspective

Hello,

My name is Samantha, and I am a PhD student at Massey University.

As part of my PhD study, I am conducting a survey intended to explore which attributes of an e-Learning system result in an overall success of e-Learning.

It is an online survey. If you have a free moment, please, take my survey by clicking here. It will take about 05 minutes of your time.

The data you enter will allow me to validate my research model, which will make a lot of difference for my PhD.

The survey is 100% anonymous - it is impossible for me to identify who completed the survey.

For more details about my research, refer to my information sheet (click here).

Samantha Samarasinghe

Appendix J: Low risk notification letter for the expert survey

MASSEY UNIVERSITY

16 February 2010

Samantha Samarasinghe
9/453 Ferguson Street
PALMERSTON NORTH

Dear Samantha

Re: A Study to Develop and Validate a Comprehensive Model of e-Learning Systems Success

Thank you for your Low Risk Notification which was received on 15 February 2010.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Dr Alexei Tretiakov
Department of Management
PN214

Prof Claire Massey, HoD
Department of Management
PN214

Dr Barbara Crump
Department of Management
Wellington

Massey University Human Ethics Committee
Accredited by the Health Research Council

Te Kunenga ki Pūrehuroa

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E humanethics@massey.ac.nz animalethics@massey.ac.nz gtc@massey.ac.nz
www.massey.ac.nz

Appendix K: Low risk notification letter for the instructor survey

MASSEY UNIVERSITY

12 August 2010

Samantha Samarasinghe
School of Management
PN214

Dear Samantha

Re: A Study to Develop and Validate a Comprehensive Model of e-Learning Systems Success

Thank you for your Low Risk Notification which was received on 9 August 2010.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Dr Alexei Tretiakov
School of Management
PN214

Dr Barbara Crump
School of Management
Wellington

Prof Claire Massey, HoS
School of Management
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Appendix L: Low risk notification letter for the student survey

MASSEY UNIVERSITY

6 August 2010

Samantha Samarasinghe
School of Management
PN214

Dear Samantha

Re: A Study to Develop and Validate a Comprehensive Model of e-Learning Systems Success

Thank you for your Low Risk Notification which was received on 4 August 2010.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Dr Alexei Tretiakov
School of Management
PN214

Dr Barbara Crump
School of Management
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Appendix M: Descriptive statistics for the construct items in the instructor and the student survey

Table M1 Number of responses, mean, and standard deviation for each item in quality of the e-Learning development and implementation process construct

Code	Items	No of responses	Mean	Std Dev.
DQ1	The e-Learning programme's educational effectiveness is measured using several methods.	195	4.14	1.74
DQ2	An evaluation process is used to improve the teaching/learning outcomes.	201	5.15	1.72
DQ3	Successful and innovative uses of technology for teaching are taken into account when measuring effectiveness of the e-Learning programme.	195	4.39	1.64
DQ4	Instructors are involved during the initial stages of the development of the e-Learning programme.	202	5.41	1.69
DQ5	Instructor satisfaction with the e-Learning programme is evaluated by regular surveys.	195	3.30	1.89

Table M2 Number of responses, mean, and standard deviation for each item in quality of the e-Learning system construct

Code	Items	No of responses	Mean	Std Dev.
SQ1	The e-Learning system allows me control over my teaching activities.	203	5.58	1.33
SQ2	The e-Learning system offers flexibility as to time and place of use.	202	6.33	.92
SQ3	The e-Learning system provides functions I need to successfully conduct my teaching activities.	202	5.34	1.40
SQ4	The e-Learning system has well-designed user interfaces.	199	5.08	1.27
SQ5	The e-Learning system provides high-speed information access.	203	5.61	1.08
SQ6	The e-Learning system is robust and reliable.	202	5.25	1.22
SQ7	Steps to complete a task (e.g. uploading and maintaining files) in the e-Learning system follow a logical sequence.	202	5.30	1.31
SQ8	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.	197	5.18	1.27

Table M3 Number of responses, mean, and standard deviation for each item in quality of the institutional support to instructors construct

Code	Items	No of responses	Mean	Std Dev.
ISI1	Technical assistance in course development is available to us.	204	5.64	1.50
ISI2	We are encouraged to use technical assistance in course development.	203	5.44	1.55

ISI3	We are assisted in the transition from traditional classroom teaching to teaching with the use of e-Learning.	204	4.61	1.77
ISI4	To facilitate the sharing of e-Learning expertise and experiences, we are encouraged to engage in peer-to-peer mentoring.	197	3.97	1.87
ISI5	e-Learning instructor training continues throughout the progression of the online class.	199	3.93	1.84
ISI6	We are provided with written resources to deal with issues arising from student use of electronically accessed data.	193	3.78	1.99

Table M4 Number of responses, mean, and standard deviation for each item in quality of the e-Learning content construct

Code	Items	No of responses	Mean	Std Dev.
CQ1	Courses are designed with a consistent structure that is easily understandable to students of varying learning styles.	194	4.95	1.36
CQ2	e-Learning instructional materials are reviewed periodically to ensure they meet programme standards.	198	5.12	1.63
CQ3	Students are provided with course information via the e-Learning system that outlines the course objectives, concepts, and main ideas.	203	6.29	0.99
CQ4	Learning outcomes provided via the e-Learning system are summarised in clearly written, straightforward statements.	196	5.97	1.10
CQ5	e-Learning activities for students are designed to encourage students to work in groups utilising problem-solving activities to develop topic understanding.	196	4.68	1.69
CQ6	Students have access to up to date information via the e-Learning system.	197	6.13	1.07

Table M5 Number of responses, mean, and standard deviation for each item in quality of the instructor support to learners construct

Code	Items	No of responses	Mean	Std Dev.

ISS1	Student interaction with instructors via the e-Learning system is facilitated through a variety of ways.	203	5.22	1.53
ISS2	Student interactions with other students via the e-Learning system are facilitated through a variety of ways.	201	5.04	1.43
ISS3	Instructors clearly explain how communication via the e-Learning system should be used.	199	5.15	1.53
ISS4	Students are encouraged to work with each other and instructors.	198	5.49	1.45
ISS5	Answers to questions posted via the e-Learning system are constructive.	194	5.78	1.16
ISS6	Answers to questions are provided in a timely manner.	195	5.77	1.16
ISS7	Instructors manage student expectations over the type and timeliness of responses to student communications.	196	5.47	1.24
ISS8	I have the ability to solve students' problems relating to using e-Learning in my courses.	198	4.80	1.53

Table M6 Number of responses, mean, and standard deviation for each item in instructor satisfaction construct

Code	Items	No of responses	Mean	Std Dev.
ISAT1	I am satisfied with the performance of the e-Learning system.	204	5.10	1.44
ISAT2	I am pleased with the experience of using the e-Learning system.	203	5.29	1.55
ISAT3	The decision to use the e-Learning system was a wise one.	199	5.58	1.44

Table M7 Number of responses, mean, and standard deviation for each item in instructor self-efficacy construct

Code	Items	No of responses	Mean	Std Dev.
ISEF1	I am confident that I can use the e-Learning system for online teaching even if I have no previous experience with using some of the features that I need to use.	199	5.25	1.54

ISEF2	I am confident that I can use the e-Learning system even if there is no one around to show me how to use it.	200	4.96	1.57
ISEF3	I am confident that I can use the e-Learning system even if I have only the user manual for reference.	198	4.81	1.75
ISEF4	I am confident that I can integrate the functions of the e-Learning system with my teaching plan.	201	5.49	1.40
ISEF5	I am confident that I have adequate ability to operate the e-Learning system.	204	5.53	1.41

Table M8 Number of responses, mean, and standard deviation for each item in instructor use of the e-Learning system construct

Code	Items	No of responses	Mean	Std Dev.
SUI1	I use e-Learning system to communicate with my students.	204	6.32	.97
SUI2	I use e-Learning system to distribute course assignments to my students.	201	5.66	1.81
SUI3	I encourage my students to submit their assignments using e-Learning system.	195	4.60	2.26
SUI4	I use e-Learning system to distribute course materials to my students.	199	6.13	1.27
SUI5	I use e-Learning system to execute student assessments	195	3.71	2.08
SUI6	I use e-Learning system to issue the grades of my students.	196	4.11	2.36
SUI7	I encourage my students to discuss the course with one another through the e-Learning system.	202	5.53	1.73
SUI8	I use e-Learning system to encourage peer-to-peer collaboration between students in their studies.	203	5.51	1.58

Table M9 Number of responses, mean, and standard deviation for each item in learner use of the e-Learning system construct

Code	Items	No of responses	Mean	Std Dev.
SUS1	I use the e-Learning system frequently to study in this paper.	189	5.33	1.65
SUS2	In most cases, I use the e-Learning system, because I choose to, not because I have to.	188	4.56	1.93
SUS3	I use the e-Learning system a lot.	189	5.30	1.69

Table M10 Number of responses, mean, and standard deviation for each item in learner satisfaction construct

Code	Items	No of responses	Mean	Std Dev.
SSAT1	I am satisfied with the performance of the e-Learning system.	189	5.06	1.37
SSAT2	I am pleased with the experience of using e-Learning.	189	5.11	1.46
SSAT3	I think e-Learning is a good idea.	188	5.88	1.39
SSAT4	I think the decision to use e-Learning is a wise one.	187	5.51	1.60

Table M11 Number of responses, mean, and standard deviation for each item in quality of the e-Learning system construct

Code	Items	No of responses	Mean	Std Dev.
SQS1	e-Learning system offers flexibility as to time and place of use.	189	6.03	1.27
SQS2	e-Learning system has well-designed user interfaces.	189	4.81	1.48
SQS3	The e-Learning system provides high-speed information access.	189	5.35	1.37
SQS4	e-Learning system is robust and reliable.	188	4.94	1.32
SQS5	Steps to complete a task in the e-Learning system follow a logical sequence.	187	5.06	1.30
SQS6	Collaboration tools such as blogs, forums incorporated in the e-Learning system are effective.	185	4.82	1.68

Table M12 Number of responses, mean, and standard deviation for each item in quality of the e-Learning content construct

Code	Items	No of responses	Mean	Std Dev.

CQS1	Students are provided with information about the paper via the e-Learning system that outlines paper objectives, concepts, and main ideas.	189	5.61	1.42
CQS2	Learning outcomes for the paper provided via the e-Learning system are summarised in clearly written, straightforward statements.	188	5.11	1.43
CQS3	e-Learning in this paper is designed to encourage us to work together utilising problem-solving activities to develop topic understanding.	187	4.24	1.66
CQS4	The e-Learning content in this paper is communicated well.	186	5.17	1.40
CQS5	The e-Learning system provides up-to-date content for this paper.	189	5.69	1.26

Table M13 Number of responses, mean, and standard deviation for each item in quality of the instructor support to learners construct

Code	Items	No of responses	Mean	Std Dev.
ISSS1	Student interaction with instructor is facilitated through a variety of ways.	186	4.59	1.63
ISSS2	Student interactions with other students are facilitated through a variety of ways.	184	4.39	1.73
ISSS3	Instructors clearly explain how communication channels should be used during a course.	187	4.69	1.69
ISSS4	Students are encouraged to work with each other and instructors.	187	4.64	1.76
ISSS5	Instructors manage student expectations over the type and timeliness of responses to student communications.	183	4.82	1.54
ISSS6	Feedback to assignments and questions is constructive.	185	5.22	1.36
ISSS7	Feedback to assignments and answers to questions are provided in a timely manner.	180	5.18	1.45
ISSS8	Instructors have the ability to solve the student problems relating to using e-Learning in the course.	181	5.17	1.43

Table M14 Number of responses, mean, and standard deviation for each item in quality of the institutional support to learners construct

Code	Items	No of responses	Mean	Std Dev.

INSL1	Students are provided with information to aid them in accessing materials provided in digital form.	187	4.55	1.60
INSL2	Students are able to practise with any relevant technologies prior to commencing a course.	186	5.00	1.50
INSL3	Easily accessible technical assistance is available to all students throughout the duration of a course/programme.	180	4.31	1.69
INSL4	Students have access to sufficient library resources accessible through the world wide web.	180	4.78	1.60
INSL5	Students can register online for courses.	183	5.60	1.36

Table M15 Number of responses, mean, and standard deviation for each item in learner self-efficacy construct

Code	Items	No of responses	Mean	Std Dev.
SSEF1	I could complete my learning activities using the e-Learning system if I had never used such a system.	186	5.01	1.71
SSEF2	I could complete my learning activities using the e-Learning system even if I have only the online instructions for reference.	187	5.05	1.68
SSEF3	I could complete my learning activities using the e-Learning system if I had seen someone else using it before trying it myself.	184	5.39	1.52
SSEF4	I could complete my learning activities using the e-Learning system if I had just the built-in-help facility for assistance.	185	5.08	1.66

Table M16 Number of responses, mean, and standard deviation for each item in level of learning construct

Code	Items	No of responses	Mean	Std Dev.
SL1	I can organise course material into a logical structure.	186	5.11	1.50
SL2	I can intelligently critique the texts used in this course.	180	4.79	1.52
SL3	I have changed my attitudes about the course subject matter as a result of this course.	184	4.36	1.81
SL4	I feel more self-reliant as the result of what I learned in this course.	186	4.44	1.71

Table M17 Number of responses, mean, and standard deviation for each item in intention to continue e-Learning construct

Code	Items	No of responses	Mean	Std Dev.

CI1	If I could, I would like to continue using e-Learning in my learning activities in the future.	184	5.58	1.56
CI2	I will continue using e-Learning as much as possible in my learning activities in the future.	185	5.44	1.60
CI3	I intend to increase the use of e-Learning in my learning activities in the future.	184	5.09	1.66

Appendix N: Results of the multivariate normality testing for the instructor and the student samples

Figure N1 Regression standardised residual results of multivariate normality testing for the instructor sample

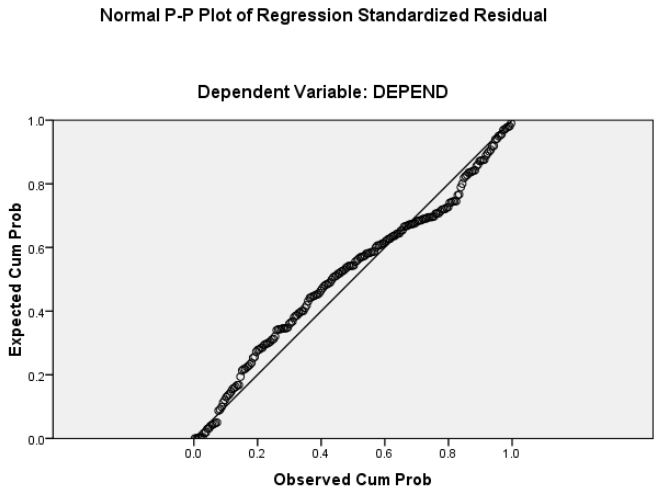
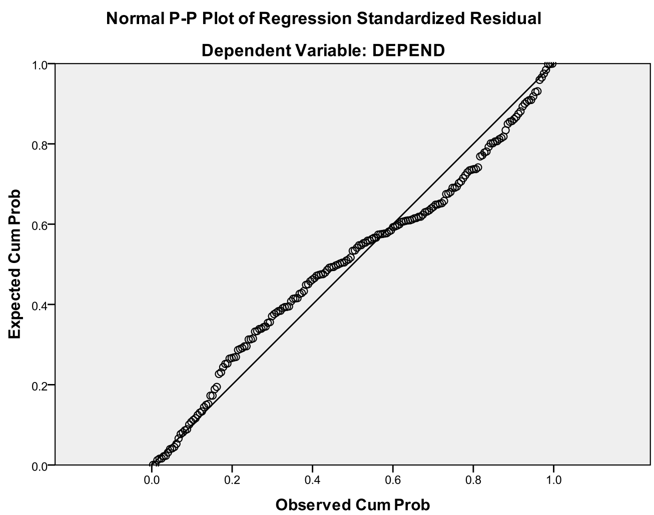


Figure N2 Regression standardised residual results of multivariate normality testing for the student sample



Appendix O: Demographic characteristics of the respondents of the instructor and the student surveys

Table O1 Demographic characteristics of the respondents of instructor survey

	Frequency	Percentage
Gender		
Male	57	28.93
Female	140	71.07
Age		
26-35 years	7	3.57
36-45 years	37	18.88
46-55 years	65	33.16
Above 55 years	87	44.39
Academic Position		
Professor	5	2.55
Associate professor	12	6.12
Senior lecturer	106	54.08
Lecturer	56	28.57
Senior tutor	17	8.68
Tutor	0	0
Teaching experience		
Less than one year	1	.5
1-5 years	8	4
6-10 years	23	11.5
11-15 years	20	10
16-20 years	29	14.5
21-25 years	38	19
More than 25 years	81	4.5
Experience in online teaching		
Less than one year	14	7
1-5 years	95	47.5
6-10 years	66	33
11-15 years	20	10
More than 15 years	5	2.5

Table O2 Demographic characteristics of the respondents of student survey

	Frequency	Percentage
Gender		
Male	116	61.38
Female	73	38.62
Age		
Less than 20 years	81	42.86
20-30 years	80	42.33
31-40 years	17	8.99
41-50 years	8	4.23
51-60 years	3	1.59
Mode of study		
Internal	163	87.17
External	24	12.83
Prior experience in e-Learning		
None	59	32.06
1-2 courses	62	33.70
3-4 courses	30	16.30
More than 4 courses	33	17.94

Appendix P: Measurement model analysis results for the post hoc analysis reported in section 6.3.7.1

Table P1 Factor Loadings and Cross Loadings for the Measurement Items

Item	DQ	SQ	ISI	CQ	ISS	ISAT	ISEF	SUI
DQ1	.37	**.82**	.37	.34	.28	.38	.39	.24
DQ2	.33	**.76**	.32	.32	.21	.34	.36	.26
DQ3	.44	**.84**	.52	.40	.10	.41	.36	.27
DQ4	.45	**.62**	.41	.36	.29	.44	.41	.27
DQ5	.34	**.77**	.50	.37	.19	.29	.39	.15
SQ1	.31	.40	.27	.43	.33	.38	**.72**	.40
SQ2	.39	.28	.27	.38	.33	.26	**.62**	.43
SQ3	.38	.40	.32	.47	.29	.41	**.73**	.43
SQ4	.42	.39	.33	.48	.28	.30	**.76**	.30
SQ5	.23	.17	.26	.29	.21	.16	**.52**	.08
SQ6	.37	.26	.31	.46	.33	.33	**.70**	.30
SQ7	.44	.31	.21	.53	.36	.33	**.65**	.26
SQ8	.40	.44	.29	.50	.33	.43	**.73**	.41
ISI1	.43	.45	**.76**	.36	.21	.32	.36	.21
ISI2	.36	.42	**.74**	.29	.16	.32	.35	.17
ISI3	.49	.41	**.84**	.41	.34	.40	.31	.18
ISI4	.43	.43	**.77**	.36	.19	.38	.29	.32
ISI5	.48	.53	**.88**	.44	.25	.41	.35	.22
ISI6	.36	.39	**.69**	.30	.13	.30	.28	.16
CQ1	**.69**	.28	.35	.46	.32	.32	.39	.14
CQ2	**.76**	.44	.46	.48	.24	.41	.41	.30
CQ3	**.74**	.36	.37	.38	.25	.41	.34	.37
CQ4	**.71**	.40	.33	.35	.28	.45	.37	.25
CQ5	**.71**	.40	.43	.46	.26	.64	.39	.44
CQ6	**.62**	.27	.35	.39	.39	.38	.41	.16
ISS1	.46	.48	.37	.45	.40	**.82**	.41	.53
ISS2	.42	.49	.37	.40	.33	**.79**	.36	.48
ISS3	.48	.44	.42	.43	.29	**.75**	.33	.39
ISS4	.54	.40	.42	.49	.30	**.84**	.43	.52
ISS5	.48	.23	.22	.38	.25	**.70**	.33	.30
ISS6	.39	.17	19	.34	.26	**.64**	.29	.31
ISS7	.28	.25	.26	.48	.53	**.58**	.32	.27
ISS8	.55	.33	.35	.39	.31	**.78**	.37	.40
ISAT1	.57	.46	.48	**.94**	.54	.59	.66	.41
ISAT2	.57	.47	.42	**.95**	.54	.57	.61	.42
ISAT3	.52	.36	.38	**.87**	.58	.43	.53	.36
ISEF1	.33	.25	.26	.51	**.89**	.41	.38	.38
ISEF2	35	.21	.21	.47	**.90**	.39	.39	.42
ISEF3	.32	.18	.18	.43	**.85**	.34	.34	.27
ISEF4	.42	.35	.33	.62	**.87**	.50	.48	.47
ISEF5	.34	.20	.22	.56	**.90**	.42	.39	.35

Note. CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.

Table P2 Internal Consistency Reliability and Convergent Validity of Measures

Construct	No of items	Composite reliability	Cronbach alpha	AVE
Quality of the e-Learning development and implementation process	5	.88	.82	.59
Quality of the institutional support to instructors	6	.90	.87	.61
Quality of the e-Learning system	8	.87	.84	.53
Instructor satisfaction	3	.94	.91	.85
Instructor self-efficacy	5	.95	.93	.78
Quality of the e-Learning content	6	.86	.80	.50
Quality of the instructor support to learners	8	.90	.87	.53

Table P3 Discriminant Validity Results

Construct	CQ	DQ	ISI	ISAT	ISEF	ISS	SQ	SUI
CQ	.71							
DQ	.51	.77						
ISI	.55	.56	.78					
ISAT	.60	.47	.47	.92				
ISEF	.41	.28	.28	.59	.88			
ISS	.62	.49	.46	.58	.46	.73		
SQ	.55	.50	.41	.66	.46	.49	.73	

Note. Square roots of AVE are shown on the diagonal; off-diagonal cells show correlations between constructs. CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development & implementation process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.

Appendix Q: Measurement model analysis results for the post hoc analysis reported in section 6.3.7.2

Table Q1 Factor Loadings and Cross Loadings for the Measurement Items

Item	DQ	SQ	ISI	CQ	ISS	ISAT	ISEF	SUI
DQ1	.37	**.82**	.37	.34	.28	.38	.40	.24
DQ2	.33	**.75**	.32	.32	.21	.34	.36	.26
DQ3	.44	**.84**	.52	.40	10	.41	.37	.27
DQ4	.45	**.62**	.42	.36	.29	.44	.41	.27
DQ5	.34	**.78**	.50	.37	.19	.29	.39	.15
SQ1	.31	.40	.27	.43	.33	.38	**.72**	.40
SQ2	.39	.28	.27	.38	.33	.26	**.61**	.43
SQ3	.38	.41	.32	.47	.29	.41	**.74**	.43
SQ4	.42	.39	.34	.48	.28	.30	**.76**	.30
SQ5	.23	.17	.26	.29	.21	.16	**.52**	.08
SQ6	.37	.26	.31	.46	.33	.33	**.69**	.30
SQ7	.44	.31	.21	.53	.36	.33	**.64**	.26
SQ8	.40	.44	.29	.50	.33	.43	**.73**	.41
ISI1	.43	.45	**.77**	.36	.21	.32	.36	.21
ISI2	.36	.42	**.75**	.29	.16	.32	.35	17
ISI3	.49	.41	**.84**	.41	.34	.40	.31	.18
ISI4	.43	.43	**.76**	.36	.19	.38	.29	.32
ISI5	.48	.53	**.88**	.44	.25	.41	.35	.22
ISI6	.36	.39	**.70**	30	.13	.30	.28	.16
CQ1	**.69**	.28	.35	.46	.32	.32	.39	.14
CQ2	**.76**	.44	.46	.48	.24	.41	.41	.30
CQ3	**.74**	.36	.37	.38	.25	.41	.34	.37
CQ4	**.71**	.40	.33	.35	.28	.45	.37	.25
CQ5	**.71**	.40	.43	.46	.26	.64	.39	.44
CQ6	**.62**	.27	.35	.39	.39	.38	.41	.16
ISS1	.46	.47	.36	.45	.40	**.82**	.41	.53
ISS2	.42	.48	.37	.40	.33	**.79**	.37	.48
ISS3	.48	.43	.42	.43	.29	**.75**	.33	.39
ISS4	.54	.40	.41	.49	.30	**.84**	.43	.52
ISS5	.48	.23	.22	.38	.25	**.70**	.33	.30
ISS6	.39	.17	.19	.34	.26	**.64**	.29	.31
ISS7	.28	.25	.26	.48	.53	**.58**	.32	.27
ISS8	.55	.33	.35	.39	.31	**.78**	.37	.40
ISAT1	.57	.46	.48	**.94**	.54	.59	.66	.41
ISAT2	.57	.47	.42	**.95**	.54	.57	61	.42
ISAT3	.52	.36	.38	**.87**	.58	.43	.53	.36
ISEF1	.33	.25	.26	.51	**.89**	.41	.38	.38
ISEF2	.35	.21	.20	.47	**.90**	.39	.39	.42
ISEF3	.32	.18	.18	.43	**.85**	.34	.34	.27
ISEF4	.42	.34	.33	.62	**.87**	.50	.48	.47
ISEF5	.34	.20	.21	.56	**.90**	.42	.39	.35

Note. CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.

Table Q2 Internal Consistency Reliability and Convergent Validity of Measures

Construct	No of items	Composite reliability	Cronbach alpha	AVE

Quality of the e-Learning development and implementation process	5	.88	.82	.59
Quality of the institutional support to instructors	6	.90	.87	.61
Quality of the e-Learning system	8	.87	.84	.53
Instructor satisfaction	3	.94	.91	.85
Instructor self-efficacy	5	.95	.93	.78
Quality of the e-Learning content	6	.86	.80	.50
Quality of the instructor support to learners	8	.90	.87	.53

Table Q3 Discriminant Validity Results

Construct	CQ	DQ	ISI	ISAT	ISEF	ISS	SQ	SUI
CQ	.71							
DQ	.51	.77						
ISI	.55	.56	.78					
ISAT	.60	.47	.47	.92				
ISEF	.41	.28	.28	.59	.88			
ISS	.62	.49	.46	.58	.47	.73		
SQ	.55	.50	.41	.66	.46	.49	.73	

Note. Square roots of AVE are shown on the diagonal; off-diagonal cells show correlations between constructs. CQ=Quality of the e-Learning content, DQ=Quality of the e-Learning development & implementation process, ISI=Quality of the institutional support to instructors, ISAT= Instructor satisfaction, ISEF=Instructor self-efficacy, ISS=Quality of the instructor support to learners, SQ=Quality of the e-Learning system, SUI=Instructor use of the e-Learning system.